

Educational Problems in Ontario and Some Policy Options

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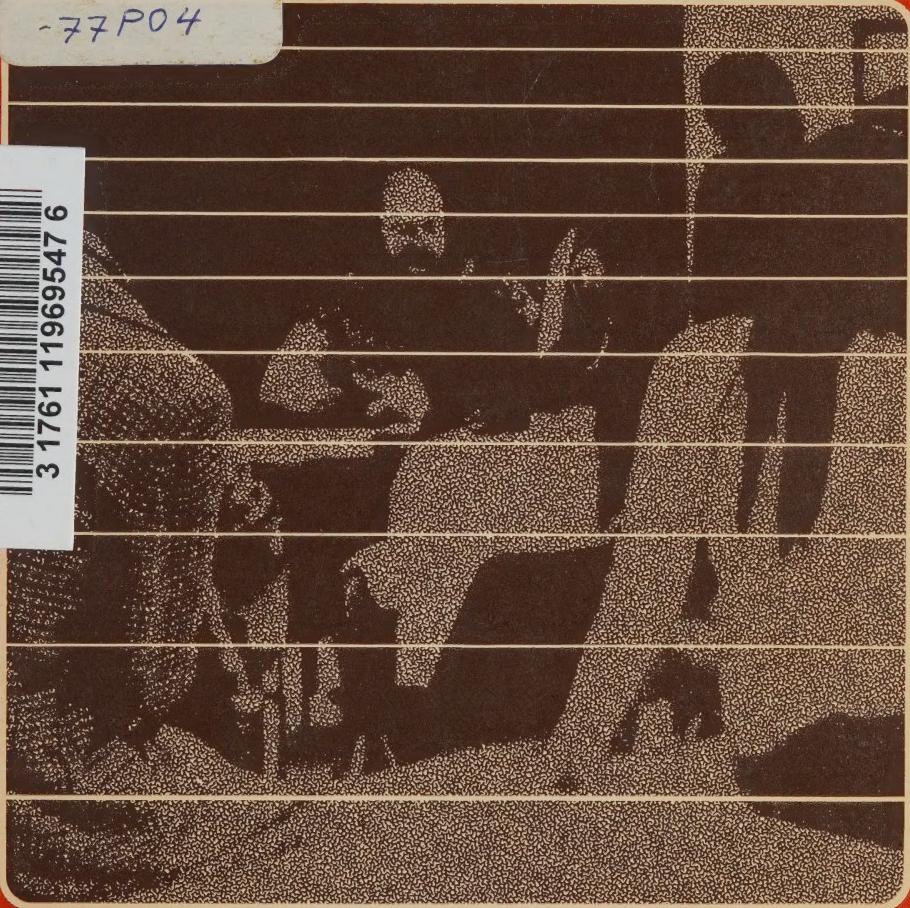
John A. Butrick

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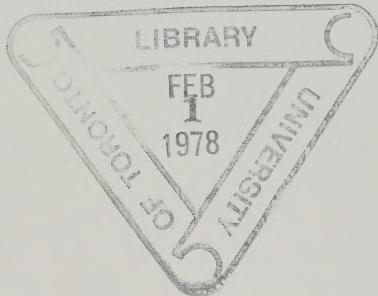
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This study reflects the views of the author and not necessarily those of the
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Preface

When I agreed to spend a sabbatical year as a research associate with the Ontario Economic Council, Who Goes to University from Toronto was almost finished and the suggestion that I look broadly at Ontario's educational system in search of "problems" was agreeable. This Report is the result of my investigation. In contrast with a purely scholarly piece of work, it contains suggestions for policy and several crude estimates of demand, supply and public educational costs.

To be of direct help to government officials and politicians, academic economists should, I believe, try to look into the immediate future. Unavoidably this means searching questionable data for facts, recognizing that what will strike an economist as a problem may not be so viewed by politician or bureaucrat, and conversely. In the political arena, problems have a way of calling forth "solutions" that will help win votes, some of which may do little more than create further problems in the manner of the physician in Keynes' Castor Oil-Bismuth example. But economics has long been known as the dismal science while politicians are probably optimistic by some process of natural selection.

Virtually every educator has been aware for several years that the educational system will face difficulties in the coming decade. The baby boom after World War II had to be followed by an echoing boom one generation later. There was also an

investment boom and a following echo. Because of the timing, a smaller than average generation has been teaching a larger than average one. This favourable (for teachers) situation is now being reversed and jobs in academic life will be hard to find.

Some educators believe there may be a deeper problem as well. They are reasonably sure that education, especially higher education, has been oversold as an engine for larger incomes and Progress. Taxpayers may agree and force politicians to shift resources away from education. In consequence, higher education could become less accessible and the class structure of society more rigid. Jan Tinbergen (1975), Nobel Laureate, has argued, however, that our dreams of an open society will come nearer if the number of persons with higher education is kept well ahead of the number of jobs traditionally associated with post-secondary educational credentials. In partial disagreement, Kenneth Arrow (1973), also a Nobel Laureate, has argued that the costs of higher education, in comparison with the benefits, may be distributed so as to damage those who stop formal education at school-leaving age.

In a general and not very precise way, these were the preconceptions that I brought to this investigation. The informal Report which follows would be poorer if the following people had not been kind enough to help: Charles Plourde, Garnet Picot, Ronald Knowles, Don Dawson and two anonymous referees improved style and detected errors; Christine Deacon, Lawrence Tsang, Richard Baxter and officials of the Ministries of Education and Colleges and Universities helped find data. Mary Seminsky and Carol Menzies typed a difficult-to-read-manuscript.

Introduction

In this Report, I try to look ahead over the coming decade to see what "educational problems" there may be. An educational problem is defined as a change in society, traceable in large measure to the performance of schools, colleges or universities, that creates political pressures and brings forth demands that the government "do something". To illustrate, if a substantial number of university graduates want to become teachers but find that there are no teaching positions for them, there will probably be an educational problem by this definition. Or, if business firms try to hire unskilled labour at minimum wages but find that students exiting from schools do not want and will not take low-level jobs, again there will be a problem. Or expanding enrolments in colleges and universities may cause such large increases in the government's educational budget that other, perhaps more worthy programs must be curtailed with attendant objections by voters.

This definition, means that "educational problems" can be created by developments elsewhere in the economy and resolved or exacerbated by government policies directed at problems which arise elsewhere. This is particularly true in the case of policies designed to change the rate of economic growth or the rate of net immigration. For this reason, any forecasts made of the numbers and educational attainments of persons entering the labour force, of the skill requirements of jobs likely to be waiting for them, and of the public

portion of future educational costs will be conditional forecasts -- conditional upon assumptions made regarding, e.g., the rate of economic growth and net immigration. In turn, these forecasts may be falsified by changes in government economic and immigration policies, as well as by changes in educational policies themselves. Indeed, one purpose of the Report is to help provide a factual basis on which educational policy over the next few years could be constructed.

In the first chapter, I examine and then critically appraise some recent forecasts made by others of the number of persons who will enter the Ontario labour force over the eight years 1974-82 and of the number of jobs that will be available to them. Following this, I modify these forecasts on the basis of assumptions designed to detect a plausible lower bound to the "mismatch" between the sorts of jobs desired by new entrants to the labour force and for which they have prepared and the sorts of jobs that will be available for them. Because manpower forecasts are notoriously and perhaps endemically unreliable, I have not tried to extend projections beyond the mid-1980's.

Chapter 2 begins with crude estimates of demand for and supply of female elementary and male secondary and post-secondary school teachers. These are followed by a discussion of a few policy options for elementary and secondary schools and estimates of the associated public costs.

The last chapter considers in greater detail issues in post-secondary education, with emphasis on universities. This emphasis seems warranted by the attention currently focussed

in the media on universities and, to a lesser extent, on Colleges of Applied Arts and Technology (CAATs). Again, some policy options are presented together with estimates of the associated public costs.

Section headings are given in the Table of Contents so that readers may skip parts with which they are already familiar. Data in support of various statements found in the text are collected in an appendix. Some of the data are not readily available elsewhere and should prove useful for purposes only related peripherally to topics discussed in the Report.

Some Forecasts

Overview

Recently, Statistics Canada released projections for Ontario of the numbers and educational attainment of persons who will enter the labour force from Ontario schools, colleges and universities. (Zsigmond et al, 1977) A few months ago, the Department of Manpower and Immigration provided parallel projections of the number of new jobs that will become available in Ontario, also by educational attainment. These two projections are summarised in Table 1 but are incomplete in that net immigrants who will enter the Ontario labour force without first attending an Ontario educational institution have been ignored. As will be seen later, the addition of net immigrants to the numbers shown in Table 1 would turn the "excess demand" into "excess supply", i.e., unemployment, and would also exacerbate the apparent employment problem facing persons with post-secondary credentials.

Before considering net immigrants, notice that in neither of the projections reported above has more than casual attention been paid to wage changes that would soon be induced by conditions of excess demand (and supply). Especially in the case of the Canadian Occupational Forecasting Program estimates (COFP), requirements or "demand" appears to have been projected independently from "supply". Yet every elementary student of economics is warned to treat demand and supply separately only in small markets. The labour market is

TABLE 1

Required additions to the Labour Force, new entrants
from the Ontario educational system and implied excess
demand, Ontario, 1974-1982
(in thousands)

Educational Level	Required additions for growth and replacement*	New entrants from schools**	Implied Excess Demand #
(a) Secondary or less	1201.9	999.8	202.1
(b) Post-secondary	297.1	369.2	- 72.1
TOTAL	1499.0	1369.0	130.0

* From COFP (1976).

** From Zsigmond (1977), Tables 12 and 33. CAAT graduates included in (b); persons with "some post-secondary education" included in (a); corrected for doubled counting because of re-entry into schools from the labour force; i.e. group (a) has been reduced by 19% and group (b) by 5% on the basis of calculations made by Zsigmond's staff.

Excess supply if minus.

clearly not a small market. The first task then is to check on the plausibility of these projections.

Accuracy of the COFP Forecasts

Although a detailed description of the methodology used by COFP is not available, crude checks may be made. The large computer output of this program, when summarized as indicated in Table 1, could have been produced by applying a (compound) interest rate of 2 per cent to the group labelled "secondary school or less" and 3 1/4 per cent to the post-secondary group and then applying an average retirement and net withdrawal rate of 2.8 per cent to both these groups. These growth rates are rather low; frequently in the past, Ontario's employed labour force has grown substantially faster.¹ Perhaps COFP has incorporated federal government policies explicitly designed to produce high unemployment rates and low rates of economic growth in order to reduce the rate of inflation, i.e. has presented what should be called a "political forecast". As worldwide inflation abates and fear of inflation dwindles in Canada, it is quite reasonable to suppose that Ottawa will do what it can to push up again the growth rates of GNP and employment. And Ontario has usually displayed rates of growth which are higher than the national average. In sum, then for the 1974-82 period, the rate of overall labour force growth implied by COFP is probably too low.

¹ Between 1965-1975, the annual growth rate for Ontario was just under 4.0% for the employed labour force.

Concerning COFP estimated withdrawals from the labour force, an annual rate of 2.8 per cent would be what would happen if each worker remained in the labour force for 35 years and there were an equal number of workers in each age. Because Ontario currently has a relatively young labour force, this rate is probably a bit too high. But changing it would not make much difference. (See Appendix Table A-1)

Regarding the manner in which COFP has divided "required additions" to the labour force by educational level, a check on plausibility is more difficult. What COFP did, by occupational level, is shown in Appendix Table A-2 and is strange. Nonetheless, the overall percentage of "required additions" who have post-secondary credentials could be correct. How would one find out? In a crude way, one can forecast demand for goods and services produced in each sector of the Ontario economy and then transform these into demand for different sorts of labour. The first two steps in this transformation are illustrated in Appendix Tables A-3. The third step, translating occupational forecasts into educational requirement forecasts, is even more treacherous.

Turning to recent history in Canada and the U.S. for guidance, one discovers the obvious: Whatever may have been the educational attainment of the employed labour force, all were employed in some occupation or other. (See Appendix Tables A-4). Take for example the occupation labelled "sales". Of males so employed in Ontario in 1971 who were 45 years or older, 4 per cent had university degrees; of males 25-44 years in 1970 in the U.S., 25 per cent had university degrees.

Another example is females in professional categories: The same Canadian-U.S. comparison shows 15 versus 58 per cent, while for males in clerical occupations the comparison is 3 versus 12 percent. Do the low Canadian percentages indicate what is really required or should an investigator use instead the much higher U.S. percentages?

Another approach to finding the "required" educational attainment of new entrants to the labour force could come from analysis of employer behaviour and the hierarchical structure of many organizations. For illustration, suppose in some market-protected firm or bureau, that seniority is strictly followed and that no boss ever hires an underling with more education than he/she has. Educational "requirements" could then easily be computed. Now modify this model by supposing that seniority in promotions is followed only x percentage of the time and that y percentage of bosses will hire persons with more education than they possess. A model of this type may be equivalent to what COFP has done but the requisite data are not available - nor would they be relevant in any obvious way.

It must be a rare person who argues that educational policy should be based on the minimal educational requirements of the various tasks and jobs now found in Ontario or soon likely to be found. In brief, it is impossible to define an optimal education mixture for the Ontario population separately from consideration of the (changing) desires, expectations, and incomes of the population on the one hand, of the opportunity costs of education on the other hand and of how

the net benefits are or should be distributed. In Indonesia, at least one employer profits by using illiterate employees to operate linotype machines and not very many years of formal education are required to work on an assembly line. In Ontario there are 12,000 lawyers while in Japan, with seventeen times as many people, there are only 7,000.

There is concern, especially among university students and bureaucrats, about "underemployment" of university students because the jobs they will get are not likely to make full use of the educations they have received. And, as graduates of colleges and universities take jobs of sorts held in the past by secondary school graduates, there will probably be parallel "underemployment" of persons with these educational attainments as well. There is, however, a problem of definition here: If consumers do not want a particular skill enough to pay for it, is a person with this skill then under-employed? In his/her own mind, the answer is "yes" - in the sense that a decent living cannot be made from the skill. If the skill was learned and the educational investment made in order to earn income, then a mistake was made; if learning and using the skill have direct consumption benefits and perhaps some positive externalities as well, then the extent of the mistake is moot. Certainly government should make and endeavour to keep a full employment promise. But government cannot promise that whatever skills a person has will be used and rewarded as the person who possesses them might wish without denying the idea of consumer sovereignty and lowering national output. That government subsidizes

some sorts of education more than others does not change this picture; although it does mean that government is partly responsible for some educational mistakes. Appendix Tables 5 suggest, however, that field of study and subsequent job are not always closely linked but that few problems are thereby created, at least in the past.

Accuracy of the Zsigmond Forecasts

The estimates provided by Zsigmond and his collaborators of the educational attainment of new entrants to the labour force are projections of labour supply which rest upon a firm demographic base and grade-to-grade retention rates which are slightly higher than have been observed, i.e., implicit assumptions have been made about the effect of demand on supply. If one separates retention rates by sex, however, the Zsigmond projections seem implausible. Take his enrolment for 21 year olds, for example. Between 1975 and 1985 for males they go from 24.9 to 23.6 while for females they go from 19.1 to 22.1. A change in patterns of discrimination against women would be required before post-secondary education becomes as profitable for women as for men.²

Further, the projected decline in the enrolment rate for males

²See Appendix Tables A-6 for data on annual earnings of females relative to males. It is unlikely that differences in productivity between men and women are as great as these reported wage differences. There are those who argue that, since many women are raised by their parents to prefer "female occupations and activities", discrimination is not the culprit. Others argue (and they convince me) that these specialized preferences are implanted as a consequence of the existence of discrimination. Parts of Arrow, (1971), are useful in this connection; just change "Black" to "Female".

is questionable. Although there may be a reduction in the private rate of return associated with post-secondary education, it is doubtful that it will fall enough to adversely affect demand for higher education. Zsigmond may, however, be assuming that rationing of post-secondary education will become more severe.

Zsigmond ignores Ontario students who leave for post-secondary education in other provinces or countries but who subsequently return to Ontario. Such students are outside the stated scope of his study but are by no means insignificant in numbers, although accurate data are difficult to obtain.
(Some data for Canada are found in Appendix Tables A-7)

The fertility rates used by Zsigmond are probably too low but, for the 1974-82 period, higher rates would make almost no difference since the Zsigmond estimates take 1974 as a base.³ He does assume annual net immigration to Ontario of 52,000 persons of all ages, with the proportion of this group entering (or re-entering) the educational system and subsequently leaving it taken from recent history. It seems doubtful if another demographer would come up with estimates that differed markedly from those provided by Zsigmond, although sharp restrictions on the immigrant flow would make his estimates slightly too high.

The estimates of "implied excess demand" reported in the last column of Table 1 would vanish if Ontario attracted over the next eight years 202,000 persons with secondary school education or less and sent elsewhere (or into non-labour

³Zsigmond uses a fertility rate of about 1.8; but see his chart II-2!

force status) 72,000 persons with post-secondary credentials. What is the probability that movements of these magnitudes will take place? The answer is "very low indeed". Consider the following bits of evidence: (1) Estimates by Vanderkamp (1973) of interprovincial moves of persons in the labour force for the period 1965-68 give Ontario a net annual inflow of only 150. Notice, however, that 1965-68 must have been an atypical period if Table 8 below is correct. (2) Parai estimates a gross flow from outside Canada into the Ontario labour force of 47,000 a year during 1961-1971. (3) Emigration from Canada is estimated by Statistics Canada as a residual which cannot be taken very seriously and emigration from Ontario does not appear to have been estimated at all. As a guess, the figure lies somewhere between 5,000 and 12,000 a year for Ontario during the past few years. (4) For 1973, the Department of Manpower and Immigration reports that about 41,000 persons entered Ontario on short-term employment visas (average duration about six months) but an estimate of the outflow of Canadians to the U.S. and elsewhere on comparable visas does not seem to be available. As an unsupported guess, suppose it is half as large and count each person on a short-term visa as half. (5) The net flow of persons into housewifely activities, prison and mental institutions, and the armed forces must be negligibly small.

Putting these estimates and guesses together, one gets an overall figure of about 50,000 annual net additions to the Ontario labour force from outside Ontario, or a total of 400,000 over eight years. This is much larger than Zsigmond

has assumed but he ignored persons coming on short-term visas, as he should have for his purposes.⁴

Principal assumptions used in this report

Having criticized the forecasts summarized in Table 1, I must now replace them with something better. Even intuitive forecasts may be viewed as produced by an initial situation plus a series of assumptions about human motivation and relationships among social and economic variables. The principal assumptions I will use are listed below. They are designed to detect educational problems and, except for the third, rest on the discussion above.

(1) A level of gross immigration and movement into and from non-labour force, non-student status such that over the next few years, an average of 29,000 net migrants will join the Ontario labour force annually. While the educational system of Ontario is, for the most part, obliged to respond to immigration policy, the government does select immigrants (and immigrants select themselves) partly on the basis of excess demand for or excess supply of persons with specialized training in Canadian labour markets, and the Ontario labour market is the largest in terms of preferred destination of immigrants. There is, therefore, an indirect connection between the output of Ontario's educational system and net

⁴Zsigmond is projecting new entrants to the labour force from Ontario educational institutions. Incidentally, for national income purposes, persons in Canada on short-term visas or temporary work permits are not included in the Canadian labour force.

immigration. This in-migration assumption of 29,000 persons is thus equivalent to supposing that the growth rate of the Canadian labour force selected by business and government is such that about 120,000 persons annually will (on a net basis) come to Canada from other countries over the next few years.

(2) An important assumption is the percentage of these net immigrants to Ontario who come with this or that skill or educational credential. Employers will want persons whose presence will prevent labour costs from rising. Students who enter the labour market from the educational system will wish to exclude immigrants with competing skills and credentials. Other voters and residents will wish immigrants whose presence will help solve rather than exacerbate social and economic problems and I presume this means a preference for persons who, while "middle class", can be "exploited". In terms of a forecast, this probably means that variation in the percentage of net immigrants who join the Ontario labour force with post-secondary education credentials will not be large. This percentage is currently about 25 per cent. I will assume that it can be changed between 20 and 30 per cent with greater variation than this in the case of self-regulating professions such as law, medicine, teaching or social work where government itself foots a major part of the wage bill. For analysis, then, two forecasts will be made, one of which is judged to be low and the other high.

(3) Next comes what may seem like a strange and contrary-to-fact assumption, namely "full employment" of Ontario's labour force. I make this assumption not because I believe that

unemployment will soon drop to the level of the voluntary quit rate but so that educational problems may be separated from problems of managing the economy.⁵ Although unemployment rates do affect university and college enrolments and, for the highly educated, are partly spurious,⁶ the important question for the detection of educational problems is the direction of causation. If causation runs from level of economic activity to the educational system and not the other way around, then analysis of educational problems requires one to assume a constant and low rate of unemployment.⁷ Of course, if there is high unemployment, many students will be unable to find jobs on entering the labour force that match their training and both students and taxpayers may perceive this mismatch as

⁵The voluntary quit rate is itself a function of the rate of unemployment, i.e., it will rise as full employment is approached. A guess would put the full-employment voluntary quit rate at about 2 1/2 per cent at present.

⁶People may stay in school longer, stay out of the labour force, or remain unemployed - waiting for a better job while avoiding jobs that seem to have poor futures.

⁷A higher unemployment rate could be used but would not affect the general results of the analysis. To illustrate, suppose that unemployment were arbitrarily set at 8 per cent or about 5 1/2 percentage points above the voluntary quit rate. Then the labour force participation rate would fall and the unemployment rate would rise for oldest, youngest, least well educated and most discriminated against parts of the population. Persons who are relatively well educated and who do not face discrimination are, in large measure protected from changes in the unemployment rate. (See Appendix Table A-8). Incidentally, the definition of "unemployment" used by Statistics Canada is not what economists mean by unemployment. Remember also that if the economy were competitive, full employment and efficiency would characterize its equilibrium position. (An "efficient" social state is, by definition, Pareto optimal in that any change would make at least one person worse off).

an educational problem. If it would vanish as unemployment disappeared, however, then the problem should be laid at the door of general economic mis-management, not at the door of the educational system.

(4) The Zsigmond projections of persons leaving the Ontario educational system for the period 1974-82 will be accepted. Together with the net immigration assumption just discussed and the assumption of full employment, there is thus a necessary implication that demand for new entrants will grow, over this period, at about 2 3/4 per cent. This forces a further assumption regarding the relative growth rates of jobs "requiring" post-secondary credentials and those "requiring" less formal education than this. Arbitrarily I take these rates to be 4 1/2 and 2 1/2 per cent respectively.⁸

(5) Because data are lacking, Ontario students who are temporarily outside the province for their further education will be ignored. Since at least half of these are believed to be graduate students and our forecasts are simply divided into "secondary or less" and "post-secondary", the error thus introduced may be small.⁹ That good data do not exist on this group of students does cause difficulties in subsequent sections of this Report.

⁸In comparison, remember that the COFP rates were 3 1/4 per cent and 2 percent respectively. Using higher rates increases the probability that real and not spurious educational problems will be detected.

⁹10,000 over the eight-year period could have taken all their post-secondary education outside Ontario.

(6) It must be emphasized that the "forecasts" generated by the above assumptions will not produce accurate estimates. The performance of the economies of Canada and Ontario, as well as the flow of net immigrants, is closely tied to economic and other events in the rest of the world which cannot be predicted with accuracy. Further, government control over the domestic economy is not good enough to compensate more than in a general and sometimes sluggish manner to domestic events, let alone to events occurring elsewhere in the world. This just means that an educational problem which is detected should be treated as probable rather than definite. Furthermore, to be sure that educational problems are detected, some assumptions have been purposely designed to make these problems fictitiously small, namely full employment, a relatively low level of net inter-provincial migration to Ontario of persons who have completed their formal education, and no Ontario residents leaving the province temporarily for post-secondary education.

Adjusted Forecasts

If one modifies the data found in Table 1 above by means of the assumptions just given, one obtains the numbers found in Table 2. Although the data underlying Table 2 are of suspicious quality, some of the numbers are large enough to mark likely educational problems: (1) At least 10 per cent of the new entrants to the labour market from Ontario colleges and university will not get jobs of the sort traditionally reserved for persons with post-secondary education. They will, of course, not be unemployed. Instead they will probably find

their way into that portion of the labour market traditionally filled by persons with only high school diplomas or less;¹⁰

(2) Turning to the group of occupations labelled "secondary school or less" and remembering that persons with post-secondary school credentials will invade, perhaps 5 per cent will be shifted (in terms of student expectations) from white collar into blue collar jobs.

Before accepting these conclusions which, in any case, rest on the full employment assumption, consider an alternative forecast generated on the basis of Appendix Tables A-3 plus judgemental use of other data found in the appendix.¹¹ The results are reported in Table 3 and show the same picture as Table 2, i.e., a great many students who come to the labour market with post-secondary credentials will be unable to find the sorts of jobs they hoped to find. Now, however, it is possible to look at prospects by sex. If these forecasts are correct, it will be the female entrants with post-secondary credentials who will be really disappointed.

¹⁰ See Appendix Tables A-4 and Bhagwati and Srinivasan (1977).

¹¹ First, using the data found in Appendix Tables A-9a, the differential sectoral growth pattern of Table A-3a was translated into occupational growth (by sex). Second, the withdrawal rates used by COFP were applied. This resulted, however, in a total of 903,000 male jobs and 702,00 female jobs. Hence, a full-employment assumption for each sex separately was applied which forced some changes in the sex ratio found in different occupations. Third, heroic assumptions were made regarding the proportion of each occupational group that would "be required" to have post-secondary credentials. See Table A-9b and A-10.

TABLE 2

Comparisons of "supply" with "demand", Ontario 1974-1982
 (in thousands)

- + Assumptions stated in text were used to modify the first column of text Table 1 above.

* Taken directly from Zsigmond with "some post-secondary" put with Grade 12 and Grade 13.

** (a) assumes 20% of net immigrants have post secondary;
(b) assumes 30%. Included in both are persons with
employment visas as well as landed immigrants.

- o Ontario students who leave the province for their post-secondary education are not counted. If they were, one might wish to use 989.8 and 379.2 instead.

TABLE 3

Apparent Excess Demand for New Entrants, Ontario, 1974-82
 (in thousands)

Educational Level	Demand	Supply		Excess demand (- Supply)	
		(a)	(b)	(a)	(b)
Secondary School or less					
	male	663	673	657	-10
	female	588	516	507	72
		<hr/>	<hr/>	<hr/>	<hr/>
		1251	1189	1164	62
					87
Post-Secondary					
	male	212	202	218	10
	female	142	214	223	-72
		<hr/>	<hr/>	<hr/>	<hr/>
		354	416	441	-62
					-87
Both					
	male	875	875	875	0
	female	730	730	730	0
		<hr/>	<hr/>	<hr/>	<hr/>
		1605	1605	1605	0
		<hr/>	<hr/>	<hr/>	<hr/>

N.B. See Table 2 for definitions of (a) and (b).
 See Appendix Tables A-11 and A-12 for the estimates from
 which this table was derived.

Notice that full employment is assumed, and that students
 leaving the province for temporary study elsewhere are
 omitted which means that excess supply of post-secondary
 is too low by perhaps 10,000.

The above remarks, which flow from the numbers found in Tables 2 and 3, ignore the effects of changes in relative wages and salaries which will take place in response to excess demand and supply. Thus, if the labour market were competitive, one would expect employers to use women instead of men in many jobs since labour costs could thereby be reduced.¹² In time this would raise female wages relative to male wages.

But the labour market is not really competitive, i.e., there is discrimination against women, minimum wage legislation exists, male-dominated professional associations and trade unions do exert monopolistic power and uphold seniority and about 25 per cent of the labour force works in market-protected sectors of the economy. In each educational or occupational category, women are paid less than men; in addition, women are segregated into low-wage occupations.¹³ In a labour market which has historically been male-dominated, discriminatory attitudes are found in both male and female members of the labour force, e.g., both males and females prefer male bosses and fear that female professionals will be less competent than males, etc. Attitudes are difficult to change, especially in non-competitive labour markets.

But competitive forces have not entirely vanished from the labour market and substantial cost savings will increasingly be available to employers who hire women rather than men. In consequence, the "excess supply" displayed in Table 3 should

¹² Some recent estimates for the U.S. are found in Tables A-13.

¹³ See Tables A-6 and Gunderson (1976) his Table 4.7.

appear among males with post-secondary credentials as well as among females.

The probabilistic events just described will affect what students and schools do. Although the wage differential paid to persons with post-secondary diplomas and degrees will narrow and thereby reduce the apparent private rate of return on investment in higher education, it will still be quite high.¹⁴ Hence, unless barriers to post-secondary education are drastically raised, the percentage of each age group that goes to college or university will not fall and could easily rise.

¹⁴Estimates of the private rate of return to education should not be taken very seriously; changes in these rates over time, however, are probably more accurate than are the rates themselves. Data limitations force one to include in the population for which a rate of return calculation is made persons of different abilities, family backgrounds and motivations. Hence, reported rates are associated with a hodge podge of variables only one of which is education. For this reason, reported rates of return attributed to a university degree (for males) of 8-12 per cent, for example, will be too high. At the same time, data limitations also force one to use estimates of expected future income from employment (after taxes) which exclude fringe benefits, psychic income derived from more agreeable working conditions, freer working hours and a higher position in the pecking order at work and in society at large. These exclusions make reported rates too low. Notice also that persons who use their education to make capital gains, manage their own investment portfolios, run their own businesses or marry wealthier spouses will have fictitiously low employment incomes. Finally, any consumption benefits of education, including the social life of a campus, are entirely ignored. Exclusion of these (positive) benefits make reported rates too low. That one is forced to use cross-section instead of longitudinal data on incomes and is not sure how much expected future incomes should be discounted for risk may just increase the uncertainty of reported rates. This depends in part on whether education and economic growth are related. Since the university educated seem to have somewhat longer but more interesting working lives and lower unemployment rates, although higher working hours per week, the estimates could be biased as well but in which direction is not clear. In this connection, is it true that better educated people are more efficient consumers and take better advantage of what government provides at subsidized prices? Estimates of the social rate of return to education are, of course, still more treacherous than are private rates of return.

Specialized post-secondary and graduate training which is closely connected to job requirements should, however, attract more students at the expense of more humanistic studies. In secondary schools, there will be employer demand for greater emphasis on training in manual skills but it seems doubtful whether the schools can or will respond. Schools, it will be argued, are not supposed to train workers for jobs that, in any case, take only a few weeks to learn.

Student Expectations

The probability of a mismatch between what students desire and the jobs they will actually take does rest upon an unstated assumption, namely that most students undertake post-secondary education largely because they will thereby become eligible for the professional and managerial jobs to which they aspire. This assumption would be false if post-secondary education is mostly viewed as a consumers' good.

Recently Paul Anisef (1975) completed a survey of the occupational expectations of Grade 12 students across Ontario. If one modifies his data by guessing at and including the expectations of students who left school prior to Grade 12, one finds that a great many students will indeed be disappointed. (See Table 4) As expectations are seen to be incorrect, they are modified. Anisef's follow-up study, however, indicates that this modification has not yet been large. Although only 74 per cent of the Grade 12 students who said they would go to university actually went there directly after secondary school, approximately 10 per cent were planning to enrol

TABLE 4

Occupational Expectations versus Actual and Projected
Occupational Distributions for Ontario
 (percentages)

	Males			Females		
	Expectations	Actual	Projected	Expectations	Actual	Projected
Managerial	7 (8)	7	10	2 (2)	2	3
Professional	30 (49)	14	17	39 (54)	19	19
Other	63 (43)	79	73	59 (44)	79	78
TOTAL	100 (100)	100	100	100 (100)	100	100

N.B. The expectations of Grade 12 students in 1973, taken from Anisef (Table 3.16b), were modified by assuming that 40% of the male and 28% of the female age cohort left school permanently prior to Grade 12 on the basis of data taken from Zsigmond (Table 12). It was assumed that none of these school leavers expected to be professionals and that the percentage who expected to be managers was half as large as for those enroled in Grade 12. Expectations of Grade 12 students alone are in parenthesis. The "actual" figures are for persons age 25-44 as reported in the 1971 census. The "projected" figures are my guesses for new entrants to the labour force (see Appendix Table A-11).

later or were attending part time and another 4 per cent went although they had said they would not.

Conclusion

In summary, likely educational problems over the next few years - if government policies do not change - are: First, a great many young females with post-secondary education will be disappointed, especially if they wish to become teachers.¹⁵ In other popular areas, female university and college graduates will also be unable to find the sorts of jobs they anticipated, e.g., in nursing or social work where government foots most of the bill. This "excess supply" problem will also appear for males with post-secondary credentials but at a much lower rate. Unless unemployment rates decrease markedly, many taxpayers, students and parents will wonder whether the amounts they spend on post-secondary education are wisely spent.¹⁶ Second, as young people with post-secondary credentials search for jobs, persons with secondary school diplomas or less will be bumped out of the lower-level managerial and administrative positions for which they have aimed and will be forced to take factory work or low-level white collar jobs instead. Women will have a special problem of this sort and some may just stay out the

¹⁵ Prospects for teachers are discussed in detail in the next section.

¹⁶ Freeman (1976a) has pointed to parallel problems now facing many young people in the U.S. Since the percentage of young people attending post-secondary institutions in Canada is only about two-thirds what it is in the U.S., Freeman's work is not directly relevant here.

labour force until there is less discrimination. Class and sex frictions of the sort that erupt when new immigrants are seen to take jobs during periods of unemployment from native-born Canadians are likely to appear.

Events of the sort just described will probably not cause post-secondary enrolments to fall; instead better educational credentials will be required (and sought) all along the line. "Job upgrading" will take place and wage differentials will narrow. This, in time, will move the income distribution towards equality. From a social point of view, these results may be good for much the same reason that improvements in the quality of products are good or a narrowing of profit rates under the impact of competition. After all, there is no reason to suppose that what is good for society will also be beneficial to every participant.¹⁷ Real gains in national output may well be a consequence of pushing more well-educated people (and especially women) into private industry and commerce and this will happen as the educational attainment of the labour force increases. To date the majority of university graduates have entered market-protected sections of the economy (see Tables A-14). This will not be the case during the next few years.

¹⁷ A Pareto Superior change requires that no person be made worse off and that at least one person be made better off, with each performing his/her own utility computations. But a Pareto Superior change is not the only way of finding a member of the Pareto Optimal set of social states; a Pareto Noncomparable change is another way. Further, to reach a member of the "equitable subset" of the Pareto Optimal set may require a Pareto Noncomparable change; one needs a social welfare function to find out.

Schools and Teachers

The data described in the previous chapter may be used to forecast the demand for new teachers and the number of persons who attend university with a desire to become teachers. In the first part of this chapter forecasts are made for the ten-year period 1976-85 for two critical groups, namely female elementary school teachers and male secondary and post-secondary school teachers. As expected, unless government policy changes, there will be a substantial "excess supply" of female elementary school teachers. But, of course, this possibility is already recognized by both government (and universities) and by potential teachers. Public knowledge of the forecasts may be sufficient to falsify them. For both sets of forecasts, therefore, I consider the consequences on supply and demand of some possible changes in educational policy.

In this way, the stage is set for a discussion of educational policy a crucial point of which is a comparison of the expected public costs of alternative policies. In an exploratory report, only a few policy options can or should be considered. I hope that those I have selected will cover a wide enough range of possibilities to be useful for policy makers.

Female Elementary School Teachers

In the professions, where most jobs traditionally reserved for persons with post-secondary credentials are

found, sex differences by type of occupation are pronounced. In 1971, for example, 79 per cent of all female "professionals" were employed as teachers in elementary schools, as librarians, or as nurses, physiotherapists or medical technicians of one sort or another, 13 per cent of all male professionals were employed in these same occupations for a ratio of almost six females to one male. The next largest number of female professionals were secondary school teachers (7 per cent of the female total) where, however, the ratio was ten females to fifteen males.¹

Until such time as discrimination against women in reduced, it is to this small group of occupations that one must look for jobs traditionally taken by females with post-secondary credentials. Growth and withdrawal rates for this group of occupations, however, are almost certain to produce fewer jobs over the next few years than will be desired by new female entrants to the labour force.

In the health area, the reason is that government is most unlikely to expand its health and medical budget for female health personnel;² in the teaching area, the reason is that elementary school enrolments will continue to decline for a few more years and will not start rising until about 1985 and reductions in pupil/teacher ratios are unlikely to produce enough jobs to compensate. In secondary schools, enrolments will fall more or less continuously from 1979 to 1990 and it is

¹A third traditional area for jobs for women with post-secondary credentials is a combined one of psychology, social work and welfare. Less than 4% of all female professionals, however, were so employed in 1971 and the sex ratio was 11 females to 10 males.

²For some data on nurses see Table B-1.

difficult to suppose that jobs for female teachers will not also fall.

Because this Report is concerned especially with educational problems, a crude estimate of the excess supply of new entrants to the occupation of "elementary school teaching" is provided in Table 5. For later use, "demand" under different policy options is estimated. To construct the table, I start with the demand for teachers and use the Zsigmond projection of elementary school enrolments over the ten years 1976-85. The Zsigmond estimates are larger than those made by the Ministry of Education, primarily because Zsigmond includes private school enrolments and predicts a much larger increase in junior kindergarten enrolments.³ Near the end of the period, both Zsigmond and Ministry projections are probably a bit too low since both use fertility rates which could easily be low. Applying pupil/teacher ratios to these enrolment projections yields a "required" stock of teachers in each year. In 1975 the overall ratio was 23:1 in public and separate elementary schools which is equivalent to 20:1 and 24:1 respectively for kindergarten and grades 1 through 8.

To go from the stock of teachers in year t to the stock in year t+1, one starts with the stock in year t, subtracts "withdrawals" (for whatever reason) and adds those who had once been teachers but dropped out to undertake other activities for a time and have now reentered. The number thus obtained

³The Zsigmond projections for junior and senior kindergarten go from 181,000 in 1975 to 211,000 in 1985; the Ministry's parallel projections go from 176,000 to 188,000.

may then be subtracted from the stock of teachers in year t+1 to yield the number of jobs available for persons seeking teaching positions for the first time. Unfortunately, the data on withdrawals and acquisitions of teachers reported by the Ministry of Education are not of high quality, e.g., there is double counting because, during the school year, a given teacher may quit one job, ostensibly to become a housewife, but actually to take a teaching position with another school board. "Other" withdrawals and "other" acquisitions are, therefore, not well defined.

Because of this difficulty, I have arbitrarily chosen 11.5 per cent as the expected withdrawal rate. (From the crude data just described, a number somewhere around 12.5 might appear better.) The variability in the percentage of all acquisitions who are taking their first teaching positions is even greater than is the withdrawal rate: during the past decade this percentage has varied between 27 and 53. Somewhat arbitrarily, I take it to be 40 per cent. Finally, in the 1971 census, 80 per cent of elementary school teachers were female and this is also approximately the percentage of persons graduating from teaching training courses with elementary school credentials who are females. To be on the safe side, I assume that, with reference to new positions, the percentage will be 85. The result of making these several assumptions is shown in Table 5 as "demand for new entrants".

Turning to the supply side, a further set of arbitrary assumptions is needed: (a) Of all female school teachers, the 1971 Census reports that about 76 per cent were teaching at

TABLE 5

Excess Supply of female new entrants into Elementary School
Teaching, Ontario for period 1976-1985
(in thousands)

	Current Ratio (a)	Lower Ratio (b)
Demand	20.1	24.2
Additional demand*	0	11.6
Less Grade 13 teachers**	- 3.3	- 3.3
Supply	33.3	
<u>"Excess Supply"</u>		
if Grade 13 cancelled	16.5	0.8
if Grade 13 retained	13.2	- 2.5

(a) The current pupil/teacher ratios of 20:1 in kindergarten and 24.1 in grades 1 through 8.

(b) Lower pupil/teacher ratios of 16:1 kindergarten and 20:1 in grades 1 through 8.

* In consequence of reducing pupil/teacher ratio from current level to 16:1 and 20:1 respectively.

** In consequence of cancelling Grade 13 and shifting an equal number of teachers from secondary to elementary classrooms.

N.B. Notice that "supply" in this table comes only from Ontario universities. But see in this connection Table 8 below and Appendix Tables B-2. As a guess, 35.0 would be a better estimate which would make all the numbers under "excess supply" too small.

the elementary level. For the coming decade, I assume that this same percentage will apply to new entrants. (b) I made use of the data collected by Anisef which shows that 28 per cent of females attending universities expect to become teachers. (c) Zsigmond provides a projection of the number of females entering the labour force with BA or MA degrees from Ontario universities and I use his projections. The result of making these assumptions is shown in Table 5 as "supply of new entrants". In fact, however, the estimate is too small since (1) some Ontario females do leave the province for post-secondary education and then return with a desire to become teachers and (2) there is net interprovincial migration to Ontario of females with these same desires who have completed their education elsewhere.

Subtracting demand from supply, each defined and computed as just described, gives the "excess supply" estimates shown in the Table. No one, however, should expect that such large numbers of young females will actually hold elementary school teaching certificates and be disappointed in their search for positions as teachers. As excess supply makes an appearance in the marketplace, relative wages for elementary teachers will be depressed and other occupations will, therefore, appear relatively more attractive. Further, as teacher training program directors and faculties see evidence of excess supply, entry to these programs will probably become more difficult and various types of non-price rationing will be used. Notice, however, that a reduction in pupil/teacher ratios would eliminate most of the excess supply.

Where will young females who, in Grade 12, "expected" to be teachers go for jobs? Common sense leads one to expect them to enter occupations where discrimination is already weakening and sectors which are expanding -- where relative wages for females should be rising. In an orderly world, research would be devoted to finding in detail which occupations these are, with the results made widely available to the public. To help prevent excess demand from turning into excess supply, however, current information should also be provided about the number of persons who are preparing themselves for these occupations. In fact very little research of this sort is undertaken.

Secondary and Post-Secondary Male Teachers

Demand and supply forecasts paralleling those just made for female elementary school teachers can also be made for new entrants to other levels of teaching, although the assumptions required are even more heroic. In the first column of Table 6 are reported the results of employing the following main assumptions: (a) Zsigmond's enrolment projections and pupil/teacher ratios of 17:1, 18:1 and 13:1 for secondary school, community colleges and universities respectively. (b) Net withdrawal rates of 3 1/2, 6, 5 per cent for teachers in each of these educational levels respectively, which may be about what they are currently, although good data are not available. (c) Alternatively three-quarters and half of new jobs at these teaching levels "reserved" for males. According to the 1971 census, males held 61 per cent. (d) 15 per cent of males who expect to take teaching positions desire to

teach (or administer) in elementary schools. Since the 1971 percentage was 25, this is conservative. (e) Zsigmond projections of number of males who enter the labour force with Ontario university degrees, together with Anisef's finding that 12.5 per cent of males who are attending university expect to obtain teaching positions.

The estimates reported in the first column of Table 6 suggest that male, first-time teachers from Ontario universities will face relatively good prospects - if the market for their skills is not invaded by women or by in-migrant and Ontario males whose teaching credentials were obtained elsewhere.⁴ Suppose, however, that there is a continuing reduction in the discriminatory advantage which Ontario males have had in the secondary and post-secondary teaching markets. Then the numbers reported in the second column of Table 6 show what might happen. Notice that the number of jobs taken by women is not sufficient, however, to eliminate the excess supply of female teachers reported in Table 5, column (a).

Towards the Solution of Educational Problems

Many of the educational problems already identified are transitory or require little more than a better flow of information regarding job opportunities for solution; others, however, cannot be "solved" without curricular and attitudinal changes or a change in educational subsidies. Still others are

⁴Tables B-2 suggests that this "invasion" has, in the past, been very substantial. See also text Table 8 below and appendix tables B-3 and B-7c.

TABLE 6

Excess Supply of new Male Entrants to Secondary and Post-Secondary Teaching, Ontario for period 1976-85
 (in thousands)

	(a)	(b)
Demand	16.7	11.2
less: cancellation of Grade 13	1.4	1.4
Supply	15.8	
"Excess Supply"		
if Grade 13 cancelled	0.5	6.0
if Grade 13 retained	-0.9	4.6

N.B. A minus sign indicates "excess demand". Column (a) is based on the assumption that 75% of the teaching jobs counted in the table go to Ontario males. Column (b) is based on the assumption that 50% go to Ontario males.

The underlying forecasts were judged to be too poor for separation of secondary from CAAT's and from universities. Notice in this connection that "supply" in this table comes only from Ontario universities. Insofar as this market is invaded by Canadians and others who come from, e.g., US and British universities, excess supply will be under-estimated. Between 1964 and 1971, for example, at least 1,634 persons with new PhD's from US universities took jobs in Canada, all of whom were Canadians. As a sheer guess, a better estimate of "supply" would thus be 18.0 which would make all the numbers under "excess supply" much too low.

contingent upon the overall level of economic activity or the level of net immigration. Before considering what might be sensible criteria for educational policy, let me comment briefly on each of these.

(1) Even though accurate long-run forecasts of job opportunities cannot be made, it is possible to inform students of apparent trends in the pattern of enrolments and net immigration as well as in the pattern of job vacancies. Persons employed by educational institutions, however, will not be strongly motivated to provide unbiased and full information.

(2) The sort of reporting just mentioned can be frustrating if the educational system does not respond to consumer demand. For example, there might be a demand by employers for computer programmers and technicians but school and university budgets may be so tight and tenure so pervasive that instructors in computer science cannot be hired. Students will be told that they must take a course in history or a foreign language instead. Difficulties in making curricular changes are especially severe if enrolments are constant or falling. When this is the case, schools and universities have inducements to misinform students about prospects and raise entry requirements in fields of unanticipated high demand (and conversely).⁵

⁵These responses by educational institutions, however, could dampen cobweb phenomena. See Appendix Tables B-4 for a distribution of PhDs, most of whom teach in universities, by field.

(3) The pattern of subsidies between elementary and secondary, between five-year secondary programs and two or three-year programs and between one and another university, college or post-graduate program can easily be such as to make more difficult adjustment of the educational system to changes in demand. At present, for example, during each of the first eight years of formal education a pupil receives a subsidy which is only about 60 per cent as large as the subsidy provided during each year of secondary schooling. And notice that the subsidies for university work in nursing, forestry, music, education are all the same but are higher than those for commerce or for general arts and science. A Ph.D student, over the nine years spent at university, even without scholarship or grant assistance, receives a subsidy that is more than eleven times larger than does a student who takes an ordinary degree.⁶

(4) Educational subsidies come from residents in the form of taxes or inflation and, in total, can easily be "non-optimal": The benefits of educational subsidies appear to be distributed over the population in a way which does not match the distribution of costs and the net result may well be regressive. (See Table B-6.) Democratic procedures and representative government are not well chosen devices for ensuring that benefits do match costs; market devices are frequently better. That education is a consumption as well as an investment activity is, in this connection, irrelevant.

⁶In addition to the subsidies represented by BIU financing, there are those found in student grant and loan programs. These are by no means limited to students whose parents are poor in part because current rules ignore parental income for students who have more than four years of post-secondary education. These rules will soon be changed. An estimated distribution of university resources by program is found in Table B-5.

(5) It is implausible to suppose that the educational system should or can expand or contract to absorb unemployment or fit well changes in the pattern of net immigration. Sometimes, however, it is asked to do just this and problems are thereby created. For instance, if unemployment is high, the private cost of staying in school another year is thereby reduced. And it is clearly less costly for employers to import a worker who comes already equipped with many years of high-cost education than to produce domestically a similar worker. Whether Ontario residents at large will gain on balance from inmigration of highly qualified manpower is moot and depends, in part, upon whether the reference population is chosen before or after the inmigration takes place.

In searching for solutions, it is not enough to know what the problems may be. One also needs to know in which direction a solution lies and have some devices in mind that could get us there. Start at what may seem like the wrong end: with devices which are available to the Ministries of Education and of Colleges and Universities. In addition to moral suasion, both ministries do have substantial budgetary control, can create or consolidate schools, colleges and universities (except for Queen's), set tuition fees, grants and loans, modify teacher credentials, and strongly influence salaries. Changes, however, must be made in a political arena which means they must be negotiated to find a compromise among the desires of various interest groups. Compromise is much easier if there is prior agreement among the major political parties across Canada. Interest groups that are in a "net gain" position

under existing arrangements may be expected to have undue political power and this is one reason why it is difficult to make changes adverse to them. Feasible solutions must be found within the limits thus imposed and frequently advantage must be taken of exogenous events. Or "emergencies" must be created or exploited in order to get noticeable change.

Elementary and Secondary Schools

One such emergency is the sharp decline of enrolments in elementary and senior public schools.* Since 1969 the number of pupils has been falling and will continue to fall until 1979, then enrolments will be constant for four years. For teachers these forecasts are alarming. Hence, they will join parents of young children in welcoming larger subsidies for the education of elementary school pupils and the resulting drop in pupil/teacher ratios. There seems to be general agreement that the early years are of great importance to subsequent academic achievement.⁷ Other segments of the population, however, will object if better elementary schools means an increase in taxes. Can money be freed from some other part of the educational system? From the secondary schools this is possible since enrolments there will start falling in 1977 and will not begin rising until about 1990. In addition, Grade 13, where about 10 per cent of secondary school pupils currently are found, could be dropped. Secondary

* Since this was written, the Government seems to have recognized officially that an emergency may exist and will appoint a Task Force.

⁷ See White, (1973) and Bereiter, (1976). Whether it is a good idea to lengthen the number of years spent in school is considered later.

school teachers however, will strongly object to this proposal but other interest groups will not - until they notice that the quality of secondary school education and the mixture of secondary courses being offered is becoming worse. And these will be likely consequences because, as the number of secondary school teachers is reduced, seniority will operate and force the firing first (or non-hiring) of younger teachers who are better prepared for and more likely to be in expanding curricular areas.

Before advocating such a policy - which amounts to (a) continuation of funding on the basis of number of pupils with (b) an increase in the amount allowed per pupil in elementary schools but (c) holding the line on the amount allowed in secondary schools and (d) abolishing Grade 13 - the consequent twin problems of quality and course mixture must be solved. Given the political strength of the Ontario Secondary School Teachers Federation, this is difficult.

There is an "Economist's Solution" which comes in several variations: installation of a voucher system in secondary school. With vouchers, each family would receive chits for four or five years of education for each child as soon as graduation from Grade 8 took place. The vouchers would be in the child's name and so could not be transferred or sold but could be used in any school in any subsequent year. Vouchers would be valued by the province each year so that, say, 14 vouchers would cover the average cost of a full year in a public secondary school but could be used to cover part of or all the tuition fees in an approved private or separate school. Private

or separate schools would, of course, charge what they wished but would be subject to audit and public reporting if they accepted vouchers and exchanged them with the government for cash.

There are three main ways in which a voucher scheme may be modified: (a) the exchange value of vouchers could be higher if the schools were public; (b) the scheme could be started after, say, Grade 10 instead of after Grade 8 (of course, it could be started earlier also); (c) requirements for school approval could be set in various ways, e.g., certain courses could be mandatory or prohibited, at least x per cent of students should attend free, at least y per cent of teachers should be certified in their areas of instruction.

The purpose of installing a voucher system is fairly obvious: to increase the freedom of choice available to pupils and their parents and thus prevent rigidities within schools from channelling students into courses that they do not wish to take or which are taught by inadequate teachers. The result would be to force out poor and unpopular teachers, as well as teachers of unpopular subjects who were unwilling or unable to change. Notice that a voucher system could be installed gradually by starting first with Grade 12, then Grade 11, etc. and by setting the exchange value of a voucher first at a small percentage of public school average cost and then increasing this percentage a bit at a time. The general rationale rests on a belief that parents have both the ability and strong inducements to find out what is good for their children. The educational attainment of parents of school

age children in Ontario is high by historic or international standards. Nonetheless, better advantage of a voucher system would probably be taken by better educated and richer parents. But it is hard to find evidence that a voucher system would be worse in this respect than the present system and, in other respects, a voucher system would be an improvement.⁸

Some Cost Estimates for Elementary and Secondary Schools

In order to choose among possible policies, a public decision maker needs estimates of public costs, as well as knowledge of political constraints and educational objectives. In Table 7 below I offer some cost estimates which are based on the seven assumptions about future events that are listed below and are admittedly crude. Nonetheless, the relative differences between the "status quo" costs and those associated with the several proposals listed should be reasonably accurate. In any case, the assumptions are given in some detail so that a reader will be able to modify them as desired and then generate alternative cost estimates.

(a) Government Economists (TEIGA) forecast an average annual per capita growth of real income in Ontario over the

⁸ Incidentally, at present the percentage of students and parents who can and do take advantage of permitted transfers between schools is small. In the Borough of North York, for example, 1% of junior high students so transferred and 3% of students in Grades 10-13, some of whom transferred to take desired languages and other specialized courses rather than to find a more suitable school. Under current regulations only if local residents do not fill a school are transfers permitted.

next twenty years of 2.3 per cent. From ignorance of the future relative strength of teachers' federations and the underlying willingness of teachers to accept increases in real wages which are less than average increases, I assume 2.3 per cent annual growth in teachers' salaries and thus make no allowance for inflation;⁹ (b) Numbers of pupils enroled are, for purposes of the status quo costs, taken directly from the Zsigmond projections. For the "equal payment voucher" proposal, the retention rate between Grades 11 and 12 is boosted by 2 percentage points from Zsigmond's projected rates (which lie between 88 and 89 per cent) and between Grade 12 and 13 by 10 percentage points (Zsigmond's projected rates are around 55 per cent). These changes in retention rates are made on the strength of parental and student attitudes, as reported in a survey conducted by OSSFT.¹⁰ (c) Pupil/teachers ratios are

⁹The reader can multiply the costs reported subsequently by whatever rate of inflation is desired but, of course, should then also multiply government revenues by a slightly larger factor.

¹⁰In (OSSFT, 1976), one finds that parents and students as against principals and teachers answered the following questions differently:

	Percentage who said they agreed among:			
	<u>Students</u>	<u>Parents</u>	<u>Teachers</u>	<u>Principals</u>
1. An early school-leaving policy should be adopted	38	35	70	90
2. Primary responsibility of secondary schools is to prepare students for further formal education	75	84	57	56
3. Some homework should be expected most nights in virtually every course	75	84	59	61
4. Each secondary school should have a community advisory committee to access programs from perspective of parents	80	75	50	52

taken to be those used earlier in conjunction with Tables 5 and 6. (d) I assume that teacher salaries are 58 and 62 per cent of total school public operating expenses for elementary and secondary schools respectively, which is about what they are currently.¹¹ (e) In the "status quo" estimates, the percentages of students attending separate and private schools are assumed to be 33 and 2 respectively for kindergarten; 29 and 2 for Grades 1 through 8; 8.5 and 1.5 for Grades 9 and 10; 8 for Grades 11 and 12; and 10 for Grade 13. This is approximately what these percentages have been recently. Under impact of the proposals made, however, these percentages are assumed to change as indicated in Table 7 below. (f) The average salaries at the start of the period for which the cost estimates apply are taken to be "day school instructional salaries" divided by "the number of full-time teachers in September", both as reported by the Ministry for 1974.¹²

(g) For purposes of comparison, I assume that each proposal goes into effect instantly. These assumptions generate the estimates found in Table 7.

The numbers reported should, of course, be interpreted as indicative of orders of magnitude rather than exact

¹¹"Public operating expenses" are taken to be the sum of required local taxation, provincial grants and subsidies and provincial "other" as listed in the Minister's Annual Report, i.e., Federal grants are neglected as are receipts from sales and "other" revenue. See Appendix Table B-7.

¹²\$13,210, \$15,908 and \$12,647 for elementary, secondary and separate schools respectively.

TABLE 7

Public Cost Estimates for Elementary and Secondary School
 (ten years, 1975-86)

Proposal	With Grade 13	Without Grade 13
<u>Status quo</u>		
1. Current pupil/teacher ratios	23,508 (104)*	(22,629) (101)
2. Lower pupil/teacher ratios	26,334 (117)	(25,478) (113)
<u>Voucher System for Grades 11-13</u>		
3. Equal payments/current ratios	24,231 (108)	(23,054) (102)
4. Equal payments/lower ratios	27,056 (120)	(25,910) (115)
5. Unequal payments/current ratios	23,631 (105)	(22,425) (100)
6. Unequal payments/lower ratios	26,456 (118)	(25,277) (112)
<u>Constant Enrolments</u>		
7. Zero budget growth		22,505 (100)
8. 2% budget growth		24,642 (109)
9. 3% budget growth		25,800 (115)

* Index numbers; base is item (7).

** On the assumption that secondary teachers move into elementary schools but retain their old salaries.

N.B. 1. Ratios of 20:1 in kindergarten, 24:1 in elementary school and 17:1 in secondary school.

2. Ratios of 16:1 in kindergarten, 20:1 in elementary school and 17:1 in secondary school.

3/4 Vouchers set at average cost of public secondary schools and higher retention rates between Grades 11 and 13 (see text).

TABLE 7 (Cont'd)

- 5/6. Vouchers set at average cost of public secondary schools if used in public schools but at half this if used in private schools. Percentage of pupils attending private schools doubles and retention rates between Grades 11 and 13 increase half as much as in (3) and (4) above.

See Appendix Table B-8 for detail on component costs.

estimates. To provide perspective, if the 1974 public costs for elementary and secondary schools were to repeat exactly for each of the next ten years, the total would be \$22,364 million; using the simplifying assumptions stated in the text to generate this same total gives \$22,505 million. If salaries of teachers rise (in constant dollars) by 2.3 per cent a year, if current pupil/teacher ratios do not change and if Zsigmond's projections of school enrolments are correct, costs will come to \$23,508 million, or an increase of only 4.5 per cent over the ten-year period.

Looking over the numbers in the table, I judge that a choice among the proposals there listed (or others rather like them) is not constrained by budgetary considerations except possibly in three proposals, i.e., the choice should be made on other grounds. I am tempted to advocate a voucher system with unequal payments, no Grade 13 (or Grade 13 used only for remedial purposes), and lower pupil/teacher ratios in kindergarten and elementary school, which would cost only 6.8 per cent more than would the status quo.¹³ Before doing so, however, I am forced to recognize that adoption of this proposal would almost certainly increase the percentage

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Educational costs could be kept from rising while quality of education is improved by careful use of volunteers. Older students can be used to tutor younger ones and for extra-curricular activities and so can persons not in the labour force or who hold part-time jobs. "Tax credits" could be used to pay adult volunteers on an experimental basis in both schools and post-secondary institutions. Government could force this by giving an institution a portion of its budget in the form of tax credits. It is expected that most volunteers would be women or past retirement age.

of young people who undertake post-secondary education. Hence it would exacerbate the "mismatch" educational problem discussed earlier - if it is really a "problem" and if government policy towards post-secondary education is not changed. To such issues, I next turn.

Post-Secondary Education

Background

If present funding arrangements continue, post-secondary enrolments will grow until 1982. What will happen thereafter is more difficult to say since a lot depends upon how accessible and attractive colleges and universities then become.¹ Dropping Grade 13 or increasing Grade 11-13 retention rates would obviously make universities more accessible while increasing net tuition fees (tuition fees minus student grants) would make them less accessible. The question is, should present arrangements be continued? Insofar as post-secondary institutions provide for faculty and students what are called consumption activities, the answer so far as net tuition fees is concerned would be "No". Only a modest subsidy seems justified on the grounds that post-secondary education is a consumption activity which should be specially encouraged.² Insofar as employers use post-secondary credentials and filters in ways well described by Kenneth Arrow (1973) they operate to the detriment of persons who have not gone to post-secondary school and again

¹ See Table C-1

² Subsidization of higher education could once and perhaps still may be justified by infant industry arguments but a stronger case is based on externalities, e.g., education creates more efficient and informed consumers, and on second-best arguments, e.g., other consumption items like automobiles are subsidized so education should be also.

public subsidies are not justified. Indeed, if credentials are the result of a random filter, post-secondary education should be awarded a negative subsidy. But colleges and universities do perform socially useful research and public service and do teach skills which sometimes benefit more than the recipients. Socially legitimate grounds thus do exist for subsidization. The questions are who should be subsidized, by how much, and in what form?

An economist may be able to lay out possible answers to those questions and, in part, this is done for an isolated society in an appendix. But the analysis presented there is not really responsive to the issues facing a province surrounded by open borders. A large fraction of post-secondary students are mobile and will leave Ontario for institutions in other jurisdictions if the private net cost is as little as a few hundred dollars lower elsewhere.³ Political considerations thus

³Currently about 14,000 or more than a third of Ontario students who attend Ontario Universities select annually a university a considerable distance from where they live. Another 1,200 leave the province annually for first year of university and about 2,000 beginning graduate students do likewise. At the same time, currently about 2,500 come annually from outside Ontario into first year at an Ontario University and perhaps another 3,000 enter from outside as graduate students. There is evidence that students who leave Ontario are academically superior to those who do not. It is not known how many of those who enter Ontario are or will become residents (more than half of those who enter as graduate students from outside Canada are landed immigrants and in recent years most landed immigrants have ended up in Ontario). These estimates are all necessarily vague because no one collects regularly even crude data on the number or other characteristics of students who leave Ontario for post-secondary education and only skeletal information is collected on those who enter. See Tables A-7 and C-2.

make it difficult for Ontario to diverge very far from current practice in other provinces towards post-secondary students.

If one were to place a zero value on the presence of post-secondary institutions within Ontario, answers would be simpler, at least in principle: (a) Support research and public service activities - some of which are now found in universities and colleges - so long as the present value of the net (positive) externalities, computed at an appropriate social discount rate, are positive and do not adversely affect by too much the distribution of wealth. (b) Fund students directly and at the lowest rates compatible with keeping the government in office and let universities charge what they choose. Students would then go where they wish and this would mostly be outside Ontario where tuition fees are heavily subsidized.⁴ For a great many years, the State of New Jersey adopted such a policy with reference to medical education and research: its medical students went elsewhere and medical research findings and physicians moved into New Jersey from elsewhere at virtually zero cost. Ontario has done and, to a limited extent, still does the same thing, both by sending many students away for post-graduate study and by receiving in-migrants from other provinces and countries who have already (mostly) completed their formal education. In this connection, Table 8 is of interest.⁵ More than half

⁴In time, tuition fees in other jurisdictions would be raised against non-residents and then Ontario universities would again become relatively more attractive.

⁵To translate crudely numbers found in Table 8 into educational attainment, apply percentages in Table A-4c and examine Table B-2a.

TABLE 8a

Migration Pattern of the Labour Force by Occupational Groups for Ontario Males
 (in thousands)

	SUBTRACT		SUB-TOTAL		ADD		
	Start with Ontario born	Emigration to U.S.	Migration to other provinces	Remaining Native Born	Foreign Immigration	Migration from other Provinces	End with 1971 Labour Force
Managerial	94.4	10.8	9.8	73.8	32.7	24.6	(7)
Professional	145.5	14.2	19.0	112.3	76.1	42.2	131.1
Clerical	128.2	5.2	8.7	114.3	41.5	20.2	230.6
Sales	163.2	6.5	14.0	142.8	50.5	24.4	176.1
All other	950.9	41.2	68.7	841.0	426.2	125.5	217.7
Totals	1482.2	77.9	120.1	1284.2	627.1	236.9	2148.2
							0.66
							0.67

SOURCE: 1971 Census of Canada, 1970 U.S. Census
 See Appendix for estimation procedure.

TABLE 8b

Migration Pattern of the Labour Force by Occupational Groups For Ontario Females
(in thousands)

	SUBTRACT		SUB-TOTAL		ADD		
	Start with Ontario born	Emigration to U.S.	Migration to other provinces	Remaining Native Born	Foreign Immi- gration	Migration from other Provinces	End with 1971 Labour Force
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Managerial	20.3	2.9	1.4	16.0	5.9	3.4	25.4
Professional	145.9	10.4	17.3	118.2	49.3	33.8	201.2
Clerical	306.4	19.6	23.1	263.7	99.1	51.1	414.0
Sales	76.6	5.2	4.8	66.6	26.5	9.7	102.8
All others	299.0	19.8	17.2	262.0	158.2	39.1	459.2
Totals	848.0	57.9	63.7	726.4	339.1	137.1	1202.6
							0.65

SOURCE: 1971 Census of Canada, 1970 U.S. Census
See Appendix for estimation procedure.

of Ontario's "highly qualified manpower" received its specialized training outside Ontario.

The Cost of Institutions

Because Ontario has decided that it wants its own post-secondary and graduate institutions, the simplistic solution outlined in the past paragraph is not feasible. It may, however, be used as a basis for estimating in a crude way the value which Ontario "acts as if" it attaches to having post-secondary institutions within its borders. To illustrate, according to Statistics Canada, federal, provincial and municipal governments paid out in 1973-74 to post-secondary institutions on behalf of students \$754,723,000, which comes to slightly more than \$3,000 for each post-secondary, full-time equivalent student.⁶ Suppose that all these students did leave Ontario to attend comparable post-secondary institutions located elsewhere where tuition fees plus extra travel come to \$2,000. If each of these students had been given \$1,500 by our government, public expenditures on post-secondary education would have been \$371 million. The difference between this and what government actually spent (excluding assisted research which could have been performed outside a university) comes to \$322 million. Take this as a crude estimate of the implicit annual value placed on the existence in Ontario of our thirty-nine post-secondary institutions. If \$322 million were distributed over the population,

⁶Only bona fide post-secondary students and the expenditures attributable to them have been counted, according to Statistics Canada.

every person 18 years or older could be given \$60 and a comparable sum in every future year, or so I will assume. At an interest rate of 2.3 per cent, this income stream is equivalent to a capital stock of \$2,626 per person, in current prices.

With such an estimate in hand, what does one say? Would the typical resident prefer to have our post-secondary institutions or would he/she prefer the cash? My own guess is that a great many residents would try for a compromise, i.e., would keep some post-secondary institutions but give themselves some cash as well. They could, for example, have four universities (Queen's, Toronto, Waterloo, Western) for probably less than half of the \$322 million on an annual basis.⁷ Nonetheless, for essentially political reasons, the government is not likely to close any of our post-secondary institutions, although it may well try to reduce the amount of public money it spends on them.

Policy options

Given the severe constraints that operate on government policy for post-secondary education, no "first-best" solutions are available. Consider: (a) It is extremely difficult to close down any of our post-secondary institutions even though doing so would improve average quality and reduce costs. (b) Political difficulties would also accompany a move towards much higher tuition fees, partly because the students now receiving educational subsidies come from highly vocal and influential

⁷Remember each full-time equivalent student is receiving \$1,500 annually in this illustration. See also Table C-3.

segments of the population and partly because tuition fees in Ontario universities and colleges must be kept closely in line with practice in other provinces. (c) But if fees are not raised, an improvement in institutional quality is desired and per capita provincial real income rises, then both costs and the proportion of young people who desire post-secondary education will almost certainly also rise. The result could easily create a budgetary problem for government. (d) Already so many young people have or soon will have post-secondary credentials that at least ten per cent, most of whom will be women, will be unable to obtain jobs of sorts they desire and for which their education has prepared them. And, as these students successfully invade parts of the labour market traditionally reserve for persons with secondary diplomas or less, disappointed workers will be found in these markets as well. While expectations may change, a short-run political problem is very likely to arise.

A partial solution will at once spring to the minds of many bureaucrats: more severe non-price rationing. If the number of post-secondary students is kept closely in line with the number of jobs traditionally held by people with post-secondary credentials, then the political problem of disappointed job seekers will vanish and government expenditures for post-secondary education can be kept within manageable limits.

Non-price rationing of post-secondary education is not new in Ontario (or elsewhere for that matter) and is accomplished through the schools, beginning at very early grades. In essence

what happens may be described as follows: First, children begin their schooling from family backgrounds and with native abilities that have already assigned to each a different probability of future academic success. Elementary schools, if anything, bias the resulting ordering of pupils by these probabilities in favour of children from more affluent homes. Second, on entering secondary school, it is a simple matter to take the bottom portion of this rank ordering and place these youngsters in two-or three-year programs, assign the middle portion to four-year programs, and reserve five-year programs for the top. In consequence, most of the students who receive Grade 13 diplomas come from reasonably well-to-do homes and neighbourhoods. There has been an orderly transmission of the class structure from one generation to the next. Third, universities as a group admit virtually everyone who applies with a Grade 13 diploma and community colleges admit virtually all who apply with at least a Grade 12 diplomas.⁸

There are problems with any rationing scheme (including the use of price as a rationing device) but what these are will vary from case to case. In the present instance, the data presented in Table 9 throw doubt on the political feasibility of rationing post-secondary education by tightening standards in secondary schools: There is no evidence that the percentage of youngsters from Grade 9 who subsequently receive Grade 13

⁸For evidence of non-price rationing of university education in Toronto, see Buttrick (1977). Table C-4 compares educational systems in US, Ontario and Canada and Table C-5 gives some information on students in CAATs and universities.

TABLE 9

Retention Rates in Ontario Secondary Schools Between Grades Indicated, 1963-75

Year						Overall*		
	8-9+	9-10	10-11	11-12	12-diploma	13-13 diploma	1	2
1974-75	113.0	91.0	88.3	85.6	84.5	61.4	72.5	25.9
1973-74	114.7	88.9	86.9	82.7	85.7	60.2	73.8	24.3
1972-73	117.3	89.0	86.4	80.7	85.3	61.6	76.0	24.8
1971-72	116.2	91.4	95.7	83.5	83.2	65.0	73.6	26.0
1970-71	115.3	93.6	85.4	87.7	82.4	64.7	75.1	28.1
1969-70**	115.4	102.4	93.3	93.1	83.4	62.1	75.9	35.0
1968-69	104.6	92.5	88.9	92.0	86.9	67.0	78.3	34.5
1967-68	104.6	92.6	90.1	91.5	87.3	61.3	80.1	32.7
1966-67	104.7	91.0	86.4	89.7	84.3	62.3	68.1	25.2
1965-66	105.0	90.0	85.8	87.4	83.1	75.4	68.2	28.8
1964-65	104.7	89.1	84.6	86.3	76.5	78.8	62.9	24.7
1963-64	104.3	88.6	84.0	91.0	72.8	77.1	50.6	19.2
							20.0	

SOURCE: Ministry of Education

+ Special education courses omitted throughout. This explains retention rates greater than 100.

* Product of each row, excluding and including Grades 8-9 respectively.

** Vocational courses omitted prior to 1970.

NB. No corrections have been made for students moving from or to Ontario nor for stopping out and repeating. Comparable rates for post-secondary cannot be computed accurately. Private school enrolments not available before 1963 and 1963-64 data may contain more errors than do other years.

diplomas has increased over the period 1967-75 or since departmental examinations were dropped even though family incomes have risen.⁹ If more severe rationing is to be installed, the post-secondary institutions will have to do it. What inducements can be provided by government? Clearly BIU financing would have to vanish, as has happened temporarily already for graduate instruction. A flat grant to each institution which is invariant to enrolment would do the trick but then enrolment limits would have to be set as well. If they were not, some post-secondary institutions might cut back to provide faculty members with a lazier life while others might expand anyway and thereby create political pressure for larger budgets.

In the old Imperial public universities of Japan, as well as in the more prestigious US private universities and in comparable campuses of some multi-campus, US public universities, enrolment limits are set and changed only infrequently. In both these countries, however, other institutions do exist which are not so constrained and offer degrees that are viewed as less worthy. In Ontario also, some universities are clearly better than others and could be given rigid enrolment limits (and budgets); other universities could be funded on a BIU basis, with rather low values set for a BIU. Hopefully, the better students would attend good universities while the poorer students would face a choice among a poor university, a

⁹A reading of Frye (1962) suggests that dropping these exams may have been a good idea.

university outside Ontario, a community college, also with low BIU funding, or no post-secondary education at all. In consequence, government expenditures could be limited and enrolments kept from rising too much.

Such a scheme would run counter to past government policy; its outlines are, however, found in present arrangements. The bulk of the academically superior undergraduate students do now attend a small number of universities: about 70 per cent of all Ontario Scholars who entered Ontario universities in 1972 went to only four institutions and about half of these went to the University of Toronto. Other excellent students went to foreign universities. This was a consequence of student choice rather than university admission policy and, for this reason, less favoured institutions could not object as they would if this pattern were imbedded in official government policy. Beyond this, such a scheme - if official - would be seen to be elitist in a class sense because youngsters from richer homes and neighbourhoods do display higher scholastic aptitude scores wherever such tests have been administered.¹⁰ Further, it would not help the mismatch between desires and jobs which especially confronts women who have post-secondary credentials.

¹⁰This relationship cannot be explained by a genetic hypothesis. It is also true - at least in Metro Toronto - that the correlation between scholastic aptitude scores and marks is higher for youngsters who attend private schools and schools in rich neighbourhoods than for less favoured youngsters.

Some Cost Estimates for Post-Secondary Education

Before advocating a continuation of present government policy towards post-secondary education, higher net tuition fees, or more severe non-price rationing, a policy maker should have some cost estimates. Those found in Table 10 rest upon the assumptions listed below and, as was the case with the cost estimates for elementary and secondary schools reported earlier, should be more accurate in a relative than an absolute sense.

(a) I start with the enrolment projections made by Zsigmond, namely a total enrolment over the ten years 1976-85 of 2,541,400 of which 54 per cent are male and 73 per cent are found in universities. Zsigmond also offers both larger and smaller projections: the largest comes to a total of 2,720,800 enrolments of which 72 per cent are in universities.¹¹ (b) To translate Zsigmond's projections into numbers of faculty members, I use full-time student/faculty ratios of 15 to 1 for universities and of 9 to 1 for CAATS after comparing Zsigmond and Ministerial data. (Part-time students are neglected by Zsigmond because they are already in the labour force and he is projecting only new entrants thereto). A constant student/faculty ratios over the ten-year period is an implicit assumption that full-time students will be a constant fraction of all students but I believe that part-time enrolments will rise. Hence, one of the estimates found in Table 10 uses a declining student/faculty ratio. (c) Although firm supporting

¹¹The high estimate might be what would happen if there continues to be substantial unemployment the lower what would happen if there is not.

TABLE 10

Estimated Provincial Grants to Universities and CAATS for ten years 1976-85
 (in millions of dollars)

Assumptions	No Change in Tuition	\$500 Tuition Increase	
		Grade 13 kept*	Grade 13 dropped**
1. Medium enrolment/ decreasing ratio	12749 (130)+	10821 (111)	11249 (115)
2. Medium enrolment/ constant ratio	12267 (126)	10310 (106)	10777 (110)
3. High enrolment/ constant ratio	13174 (135)	11080 (113)	11577 (118)
4. Constant enrolment zero budget growth		9766 (100)	
5. Constant enrolment/ 2% budget growth		10693 (109)	
6. Constant enrolment/ 3% budget growth		11195 (115)	

* Assuming a 2% reduction in enrolments is induced by the fee increase.

** Assuming a 6% net increase in enrolments is induced.

+ Index numbers; base is (4) below

NB: See Table C-6 for components of these costs. "Decreasing student/faculty ratio" goes from 9 to 8.1 for CAATS and from 15 to 14.1 for universities. "Constant enrolments" at 1976 levels.

data are not available, I assume that faculty salaries are rigid at 54 per cent and 62 per cent of provincial grants to universities and CAATs respectively.¹² (d) Average salaries in both sorts of institutions will, I suppose, rise at 3 per cent annually in constant dollars. In the case of elementary and secondary schools, 2.3 per cent salary increase was used. But post-secondary institutions will be expanding for a few more years and average faculty age will probably increase faster. (e) Student grants per enrolment are assumed to rise at 2.3 per cent per year and, because of the subsidized nature of student loans and to allow for default, 10 per cent of loans are treated as grants.* When reconciled with known 1973-74 provincial grants totals, these assumptions yield the numbers reported in Table 10.

As the numbers in the table indicate, there will be a budgetary problem if government policy does not change, i.e., post-secondary costs are almost certain to rise more rapidly than do government receipts. Only if tuition fees are raised substantially,¹³ BIU grants reduced by a corresponding amount, and Grade 13 is kept will these "cost overruns" vanish. And this "solution" will be politically difficult unless all political parties agree and Ontario can induce other provinces to raise fees also.

¹²See Appendix Table B-7.

* Since this was written, the Ministry of Colleges and Universities has released the "Report of the Interim Committee on Financial Assistance for Students". If even some of the recommendations made by this committee are adopted, a much larger proportion of student aid will go to students whose parents are poor and, in other ways, aid will be distributed more equitably.

¹³Loans (or grants) could be provided for students whose parents are poor.

If one takes the total provincial budget for education instead of just the post-secondary portion, there is less cause for alarm. To illustrate, suppose provincial receipts rise over the 1976-85 decade by an annual rate of 3 per cent. If educational expenditures were to take the current (constant) fraction of the budget, $\$25,800 + \$11,195 = \$36,995$ would be available.¹⁴ Hence, even though post-secondary grants rose to \$11,600, \$25,395 would remain for elementary and secondary schools. If the estimates found in Table 7 are accurate, this should be enough. Thus the Ministry of Colleges and Universities faces a budgetary problem which could be solved by raising fees, by more severe rationing, or by shifting funds from the Ministry of Education.

Rationing: Pros and Cons

From a pragmatic political point of view it may seem best to ration more severely. Most of those who would be immediately affected adversely by fee increases are already attending a university or college, and would, therefore, easily be able to organize against higher tuition fees. In contrast, those who would be affected adversely by stricter rationing are under voting age and cannot yet identify themselves, nor can their parents except probabilistically. Further, rationing will prevent the "mismatch" between expectations and actuality in

¹⁴If the budget were to grow at 2% however only \$35,335 would be available without cutting into other programs.

the market for workers with post-secondary credentials, albeit by Procrustean means.

From the point of view of the public interest, even the existing degree of rationing is a mistake as earlier argued. Stricter rationing cannot be justified on emergency grounds and would exaggerate the class bias already found in post-secondary institutions, and especially in universities. On the basis of the historical record and analysis of how rationing in education works, those who would be denied post-secondary education if "standards" were raised would mostly come from poor families and neighbourhoods.¹⁵ Further, since stricter rationing would remove the budgetary necessity for fee increases, the unwarranted heavy subsidization of post-secondary students at the expense of ordinary taxpayers would continue. These consequences would work in tandem to prevent the income distribution from shifting in the direction of equality and to keep intact the existing class structure. Only from the point of view of the upper and upper-middle class would this be a

¹⁵ Probably a third of the students who display scholastic aptitude in the top quarter of all students when they are in Grade 9 never reach Grade 13 under existing rationing arrangements. At the same time, perhaps 20% of those with scores in the bottom quarter do reach Grade 13.

good idea.¹⁶ Finally, rationing is not likely to prevent a mismatch between jobs and expectations for women with post-secondary education since differential rationing (or differential fees) on the basis of sex would be illegal.¹⁷

Because government has so heavily subsidized post-secondary education in the past, the tuition fee increases needed to prevent budgetary problems and make fees match (adjusted) marginal costs are probably not yet politically possible.¹⁸

¹⁶There is a short-run, second-best argument in favour of rationing which, however, depends critically upon two assumptions regarding screening: (1) University graduates from richer families have first claim to well-paying and socially important jobs while graduates from less affluent families are forced to take jobs that are left over. (2) When the university participation rate increases, more academically smart youngsters from poor families go to university but more academically incompetent youngsters from rich families also go. In consequence, the average competence of persons holding well-paying and socially important jobs declines to the detriment of the whole society. If these assumptions describe the real world, rationing could be used to deny credentials to academically inferior but rich youngsters and thus prevent this decline in average competence from taking place. (At the same time, of course, the percentage of middle-level manpower with university training would be kept from rising and this would be socially damaging in the longer run). This argument falls apart if universities keep out academically incompetent youngsters, regardless of parental background or if high status parentage is not a necessary condition for claiming an important job.

¹⁷Higher tuition fees would, however, probably reduce the enrolment rate of women more than of men because the pecuniary value of a university degree is less for women because of sex discrimination in the labour market.

¹⁸On the basis of estimates made by Razin and Campbell (1972), the institutional marginal cost of a four-year university degree may be about \$4500 in Ontario. These costs should be adjusted for externalities which, however, are difficult to estimate.

That youngsters from relatively rich families have been subsidized in the past makes it seem unfair to raise tuition fees now that the proportion of the age group, particularly women, enrolling in post-secondary institutions has risen. And this sense of unfairness is magnified by the apparent reduction in the private rate of return associated with post-secondary training. Why should this generation of young people and parents be required to pay more for less? The "solution" of stricter rationing thus becomes more seductive.¹⁹ And as higher admission standards work to the disadvantage of youngsters from poorer families and neighbourhoods, the blame can be placed on post-secondary institutions, not on government.

Post-secondary: A proposed policy

Given the constraints on policy that come from historical precedents and policies in other provinces, I advocate a compromise, namely: (a) Start with scholarships for unusually promising students. Let each secondary school award three-year, full-tuition scholarships to say 10 per cent of its Grade 12 class.²⁰ These scholarships would not be limited to field of study and could be used anywhere in the world but would pay only half-tuition if used outside Ontario. (b) Let the universities award parallel scholarships for graduate or professional study, with the number of scholarships assigned

¹⁹ If post-secondary degree recipients are disappointed in their search for desirable jobs, right-wing political solutions could gain credibility and rationing might be advocated to prevent this.

²⁰ Schools and universities could, of course, split a scholarship among two or more students.

to each university set in proportion to the number of Ontario Scholars graduating with baccalaureate degrees plus a small constant. The total might be put at 10 per cent of province-wide, third-year university enrolments.²¹ (c) Push tuition fees up as rapidly as is politically feasible to the point where they equal the average (adjusted) marginal cost of instruction but make loans readily available to all students at the market rate of interest. Make repayment of loans optionally contingent upon income and capital gains as reported for income tax purposes, on a sliding scale. However, elimination of educational debt by bankruptcy should not be permitted. (d) Divide grants to post-secondary institutions into two parts, one part based on enrolments on a declining BIU basis, the other based on published research output and public service activities. (e) Let each institution after a time charge what it will for tuition in each faculty or course, with mandatory public reporting of all costs. (f) Provide estimates of expected job vacancies and salaries associated with various post-secondary credentials, as well as the number of students working towards these credentials.

Important details of this proposal need to be worked out but are beyond the scope of the Report. Clearly it could not be installed all at once. In general, the aim is to introduce a bit more competition into post-secondary education and thus reduce waste, to induce institutions to be more responsive to student's curricular demands and to give separate public

²¹Scholarships should also be provided for selected migrants from other provinces and countries, probably on the basis of competitive examination.

recognition and support for the important non-instructional activities of post-secondary institutions.

As outlined, the scheme has two major apparent shortcomings: First, it will reduce only a little the mismatch between jobs and expectations earlier discussed; second, it will set the stage for future questions of institutional quality and support. With regard to the mismatch problem, I believe that government is well advised to push this problem towards a market solution, making sure, however, that the best information available on future job vacancies and job seekers by occupation (and area) is provided publically. Given the skewed age distribution of faculty, the very high percentage of faculty who are tenured and the large and scattered number of post-secondary institutions and graduate programs, the problem of quality is likely to be with us for many years. Perhaps it does take at least fifty years for a university to find sensible internal decision procedures and gain a faculty of competence well distributed by age and areas of specialization.

There are government policies that would help to concentrate and so isolate this problem of faculty quality. Funding for research and public service that is separate from funding for instruction should help in this regard, especially if research and public service grants and contracts were accompanied by overhead payments.²² Then institutions engaged in these

²²To award grants and contracts for research directly to investigators, with minimal or zero overhead to the university, gives the university no financial stake in research and causes teaching to be overemphasized. That every university has the legal right to award graduate degrees, coupled with graduate BIU's that have greatly exceeded instructional cost, has scattered graduate programs and students across the province. The task of collecting the most competent research workers in a few institutions has thereby been made more difficult than need be.

activities would be induced to search for competent persons and to reward them with higher salaries and greater power over institutional decisions. In turn, those who are competent would find employment situations where their productivity would be both high and appreciated, as is more likely if an institution already employs persons with complementary skills and interests. Institutes and centres that offer temporary positions to faculty members and others whose regular jobs are elsewhere could be especially helpful and might be encouraged with startup and sustaining grants. To decide which institutions should be favoured, past performance is probably the best guide and has the advantage of being impersonal.

More generally, it still is true that policies of government in non-educational areas can help solve educational problems: full-employment and a relatively high rate of growth is one; a refusal by governments to use post-secondary credentials in their own hiring is another; an insistence that licensing and eligibility tests and procedures ignore such credentials would also clearly help but has been recommended many times in the past without noticeable effect. Finally, efforts directed at the reduction of wage and job discrimination based on sex would be very beneficial, e.g., a lower income tax rate for females.

Appendix on Social Value of Post-Secondary Education

Society is entirely willing for most residents to capture any consumer (or producer) surpluses they can find, subject to the proviso that they do so legally. Education is the only market, however, which has been organized by government explicitly to select the persons who will receive these surpluses and then controlled so that they are large. In a lottery, for example, the winning ticket is worth a lot, but who gets it is a random process. A crucial issue, then, is the fairness of the selection system used in education. We are told that "equal opportunity" is the aim and that that makes subsidies provided for post-secondary education just like a lottery. The facts are, however, otherwise. Each youngster does not and cannot have an equal opportunity to continue in school past school-leaving age: genetic endowments are not all the same nor are parents and the upbringing they are able to provide nor is what each student gets from elementary and secondary school the same.

By retreating to a pre-birth stage, one can make the "surpluses" provided by post-secondary education look like prizes delivered by a random draw but this cannot be the rationale.¹ It is more plausible to suppose that post-secondary

¹Which pre-born baby is delivered to which family at which moment in history and with which collection of genetic endowments could be viewed as the result of a lottery conducted by Nature.

education is designed to give prizes to those who are academically most successful in school from unequal starting positions. View it thus as additional training for persons who have been pre-selected for positions of leadership. Leaders should, after all, be smart and well educated. This would be a satisfactory rational if leaders provided positive externalities to the rest of society which were "equitably" distributed. In times past, when a tiny fraction of the labour force went to university, this may have been true; as the percentage with post-secondary education rises to a quarter or half of the labour force, it is less likely to be true. Indeed, plausible estimates have recently been made which suggest that the private benefits of post-secondary education exceed the social benefits,² that, for most of the rest of the population, those with post-secondary education may create negative externalities. Some university and college graduates are paid less than the social value of their marginal product, but so are some of those who never received post-secondary education. The question then is: Does university or college attendance increase the probability that a person will be "exploited" in this way or increase the absolute size of the net positive externality provided for the

²Table B-6 presents a comparison of estimated extra after-tax earnings and extra tax receipts that were associated with education beyond school-leaving, for persons who attended City of Toronto public secondary schools during the early 1970s. Of course, a portion of the extra earnings should be attributed to family background and to genetic endowment, both of which could be called "luck".

rest of society? There seems to be no firm evidence one way or the other.

To this point in the argument then, I conclude that only a very weak case can be made for subsidization of post-secondary education, from which it follows that the burden of proof should be placed on those who advocate more than a few dollars a year in post-secondary subsidies. Before accepting this conclusion, however, there are three provisos: (1) In addition to teaching, universities and colleges do act as repositories of knowledge and supply socially useful research and public service. These are "public goods" and provide a valid basis for subsidization.³ (2) To some extent, universities are like famous monuments or works of art and are desired, along with their graduates, as a sign that the society is worthy of historic interest and a further step in "mankind's progress". (3) Post-secondary education has historically provided a route by which some children from poor families have been able to better themselves and may have improved the distribution of wealth in society.

The implications of these provisos for the funding of post-secondary educational institutions are difficult to establish. The first simply means that the funding of research and public service should be separated from the funding of instruction (although, because of joint production, the amount

³Public goods are those such as TV, national defence or (some) research which, if provided for some, are then available to all at no extra cost. They should be distinguished from "private goods" which carry a zero price because of excess supply or high collection costs.

of such funding may be contingent upon the amount of teaching). And it should be noted that some research or public service benefits society very little and may be harmful. The second does not imply that universities or colleges are the only hallmarks of achievement and thus raises the question of what sorts of hallmarks society desires and the relative costs of one as against another, as well as the question of the proper fraction of society's resources to spend on symbols of progress. The third also creates more questions than it solves. There is the empirical question: Do post-secondary institutions make the distribution of wealth more or less "equitable"? But this question cannot be answered until society has decided what is equitable. This society has not done and probably cannot do. If one replaces "equitable" by "more nearly equal", it seems clear that, at present, post-secondary educational institutions, funded as they are, have very little effect on the distribution of wealth, i.e., although some poor students do become richer by going to university, a great many other poor students (and a few richer ones) are made worse off by the fact that they did not go while others did. However, who goes is probably a decision on which schools and universities have very little control; parental and neighbourhood effects are much more important.

In conclusion, then, I find that the case for subsidization of post-secondary education is very weak, except for research and public service components. The implication is then obvious: Let tuition fees rise until they cover nearly the full cost of teaching but provide direct subsidies to any institutions, on a

cost effectiveness basis, that are engaged in socially valuable research and public service activities or that are producing hallmarks of culture. At the same time, provide grants directly to young people who, in consequence of receipt, will probably increase the net positive externalities available to the rest of society. Finally, insofar as society desires to redistribute wealth towards equality, provide special grants to academically eligible students whose parents are poor. This last suggestion, however, should be guarded since there are many ways of bringing a more nearly equal distribution of wealth; which mixture of methods is adopted should be based on cost-effectiveness test. Zoning for mixed-income neighbourhoods, subsidized child-care centres for children from disadvantaged homes, or a negative income tax may be more efficient means.

Forcing universities and colleges to get the bulk of their needed revenues from tuition fees is an incomplete policy suggestion and one that will be unpopular with politically important parents, students and institutions. Countervailing political power will be difficult to find and organize. Many taxpayers believe that an important way of getting their tax money's worth is a subsidized university or college education for their children. If they believe that their taxes will stay the same when tuition fees rise and that a cutback in post-secondary education public funding will simply mean an increase in government waste or spending on programs which are less important to them, then the policy proposed will be staunchly opposed.⁴

⁴This argument may be stated more technically: if some commodities are subsidized and sold for less than marginal cost, then a second-best policy may require other commodities to be subsidized also. Higher education could be one of these other commodities.

Appendix on Procedures used to Produce Table 8

(prepared by Lawrence Tsang)

In summary the estimates of migrants in Ontario reported in Table 8 were made as follows: We began with the data for immigration to Ontario and the Ontario 1971 labour force (columns 5 and 7 respectively) which come directly from the 1971 Census of Canada. However, emigration to U.S. and migration to and from other provinces (columns 2, 3 and 6 respectively) had to be estimated from incomplete data. The remaining columns were then obtained by subtraction. For simplicity, emigration to countries other than the U.S. (including returning immigrants) was ignored. In consequence, our estimates of native born are too large. Persons who were born in Canada and emigrated to the U.S. are reported by sex and occupation in the 1970 U.S. Census. Whether they were Canadian citizens as well as Canadian residents before they left or whether their occupational status was obtained before or after immigration is not known.

The 1971 Canadian census gives the age, sex and birthplace of residents in each province and of persons migrating between provinces during the past five years, for persons five years of age or older. Assuming that the proportion of those who are less than five years matches the population at large (actually it is believed to be smaller), an age distribution of migrants is obtained. To this age distribution, one can then apply labour force participation rates and distribute persons in the labour force in each age group by occupation.

For migrants leaving Ontario, Canada-wide labour force participation rates and occupational distribution in each age group were used; for migrants to Ontario, the parallel Ontario rates were used.

The 1970 U.S. Census does not report the province of origin of Canadian immigrants. To estimate the portion that came from Ontario, we used the ratio of urban dwellers in Ontario to all urban dwellers in Canada. Implicitly we thus assume that rural immigrants stop temporarily in a Canadian city before going to the U.S. and that the probability of going to the U.S. is the same for a city dweller wherever in Canada he/she may live.

The estimates that result from these assumptions and calculations are admittedly crude. Furthermore, they do not bear directly on the question of education, e.g., did a person emigrating to the U.S. or coming to Ontario move with a final degree in hand? Partial information on this matter is found in Table B-2a. The data there reported are not inconsistent with the estimates found in Tables 8.

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TABLE A-1

Labour Force of Ontario, Various Years
 (percentages)

Age/Sex	Years		
	1975	1986*	1991*
15 - 24			
Male	13.8	11.1	10.1
Female	<u>11.6</u>	<u>10.6</u>	<u>9.1</u>
	25.4	21.7	19.7
25 - 34			
Male	16.0	16.3	15.9
Female	<u>9.8</u>	<u>11.7</u>	<u>11.5</u>
	25.8	28.0	27.4
	51.2	49.7	47.1
35 - 44			
Male	12.2	13.4	14.3
Female	<u>7.1</u>	<u>9.9</u>	<u>10.8</u>
	19.3	23.3	25.1
45 - 54			
Male	11.1	9.2	9.7
Female	<u>6.1</u>	<u>6.1</u>	<u>6.6</u>
	17.2	15.3	16.3
55+			
Male	8.5	8.6	8.6
Female	<u>3.8</u>	<u>3.1</u>	<u>2.9</u>
	12.3	11.7	11.5
All	100.0	100.0	100.0

* Medium fertility (1.99 by year 2001) and net in-migration of 50,000 per year.

SOURCES: TEIGA (1976b)

TABLE A-2

COFP Estimates of percentage of each occupation "requiring"
Post-Secondary Credentials

Occupation	Year	
	1974	1982
Managerial	36.3	37.0
Professional	100.0	100.0
Clerical	0	0
Sales	0	0
Service	0.3	0.3
Others	1.0	1.1
All	16.1	17.4

TABLE A-3a

Sectoral Distribution of the Employed Ontario Labour Force,
1970 and 1985

Sector	Ontario Government**		Census
	1970	1985	1971
Agriculture	4.4	2.4	3.9
Other Primary	1.8	1.0	1.5
Manufacturing	28.1	20.1	24.5
Construction	6.1	6.2	6.1
Transportation	7.5	6.1	6.6
Trade	16.1	19.3	14.8
Finance	5.2	6.4	4.6
Services	24.4	31.1	23.5
Public Administration	6.3	7.4	7.4
NEC/NR*	---	---	7.1
Total	100.0	100.0	100.0

* Not elsewhere classified and not reported.

** TEIGA (1976a) projections

TABLE A-3b

TEIGA Forecast of Employed Labour Force for Ontario by
Occupation

Occupation	1970			1985		
	Male	Female	Both	Male	Female	Both
Managerial and Administrative	6.8	2.3	5.1	6.7	2.3	5.0
Professional	12.7	21.1	15.9	12.8	20.3	15.7
Clerical	8.5	38.4	20.0	8.8	37.4	19.7
Sales	12.8	11.0	12.1	12.7	10.2	11.7
Service	11.4	17.5	13.7	10.8	16.7	13.0
Other	47.8	9.7	33.2	48.2	13.1	34.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

Note: The translation of the data found in Table A-3a by sectors into occupations was made using the coefficients reported in Table A-9a. Hence, the numbers reported for 1985 are not a forecast but only what would be found if the coefficients of Table A-9a were unchanging. NEC/NR disregarded.

TABLE A-4a

Educational Attainment of the Labour Force Ontario (1971) and
USA (1970)
(percentages)

Educational Level		45 Years or More		25-44 Years	
		Ontario	USA	Ontario	USA
Less than Grade 12	M	70	52	58	32
	F	65	45	55	29
Grade 12 or 13	M	19	26*	24	35*
	F	27	34*	33	45*
Some University	M	5	10	7	13
	F	5	11	7	12
University degree or more	M	7**	12	11**	19
	F	3**	10	6**	14
Total	M	100	100	100	100
	F	100	100	100	100

SOURCE: Censuses

* Grade 12

** Ordinary (3 year) degree included

TABLE A-4b

Percentage of Employed Labour Force with University degrees by
Occupation and Sex, Ontario 1961, 1971

Occupation	1961		1971	
	Male	Female	Male	Female
Professional	43.5	14.7	46.7	17.5
Managerial	9.2	3.5	26.2	13.0
Sales	3.5	0.5	5.0	1.6
Clerical	2.1	1.1	4.5	2.4
All Other	0.7	0.3	1.7	1.2
Total	5.5	2.7	8.3	4.7

N.B. The 1951 Census does not separately report persons with university degrees.

SOURCES: Census

TABLE A-4C

Percentage with a university degree* or more for selected occupations by age and sex, Ontario (1971) and USA (1970)

Occupation		45 Years or More		25-44 Years	
		Ontario	USA	Ontario	USA
Professional	M	44	56	50	64
	F	15	50	21	58
Managerial	M	26	21	30	31
	F	12	13	14	16
Sales	M	4	14	6	25
	F	1	3	2	4
Clerical	M	3	8	6	12
	F	2	4	2	4
Other	M	1	2	2	2
	F	1	1	2	1
Total	M	7	12	11	19
	F	3	10	6	14

SOURCE: Censuses

* Ordinary (3 year) degree in case of Ontario

TABLE A-5a

Distribution of 228,115 Ontario residents who hold university degrees and are employed by field of study for last degree and occupation, both sexes

Occupation	Educ.	Field of Study						Math. Phys.Sci.	Gen'l Arts & Science	Total
		Fine Arts	Human.	Soc. Sci. Law	Agric. Biol.Sci.	Engin. Arch.				
Teaching (not univ.)	640	57	570	337	136	62	38	155	170	2164
Manag. & Admins.	201	4	107	349	65	219	40	80	79	1144
Related to Mgr. & Adm.	21	2	121	477	31	109	7	55	72	896
Eng. & Arch.	3	1	3	40	7	710	--	31	9	804
Physicians	1	0	--	2	12	--	577	1	2	597
Teaching (univ.)	32	8	133	121	54	40	30	93	2	513
Soc.Sci., Libr., Soc.Wkrs.	26	3	153	251	13	11	2	14	16	490
Clerical, etc.	44	15	138	153	22	9	5	21	58	466
Lawyers, judges, etc.	2	--	8	293	--	2	--	2	23	330
Nat'l Science	1	--	1	11	135	22	6	132	4	311
Related to Nat'l Sci, Eng.	4	1	8	59	27	74	1	123	9	307
Tech.Sales, Comm.Travel	9	1	24	118	11	41	1	19	33	257
Related to Health	6	--	4	8	55	2	160	5	4	254
Related to Soc.Sci., Law	45	--	48	93	4	3	2	4	16	215
Other Sales	10	7	36	78	15	21	4	16	24	210
Artistic, Recreational	13	20	84	35	6	5	4	8	20	196
Religion	6	--	170	5	--	--	1	--	10	192
Police, Armed Forces	4	0	14	29	4	32	8	13	7	109
Grad. Nurses	1	2	3	2	2	0	70	0	2	81
Primary	4	0	12	15	28	9	0	3	5	76
Other Services	12	1	8	23	10	5	--	5	10	73
Other	28	8	44	71	27	74	5	36	24	315
Total Employment	1113	130	1689	2570	664	1450	969	816	599	10000
% not employed *	14.5	15.8	17.6	8.5	18.2	4.3	8.8	8.3	28.9	12.6

* Presumably because they are students, housewives, retired; including "not employed" there are 260,880 degree holders.

Source: Highly Qualified Manpower 1973 Survey.

N.B.

Based on a questionnaire mailed to a sample of 47,000 persons drawn from the 1971 Census of whom 72% were found and completed the questionnaire fully. Thus bias is probably present. Of the entire sample, however, only 1% refused to answer some or all questions; the rest could not be found.

TABLE A-5b

Average Employment Income by Selected Degrees and Fields of Study for Males born 1930-34 and 1920-29 who worked full-time for at least 40 weeks, Canada, 1971-73
 (thousands of dollars)

Field of Study	Birth Year	All degrees	B.A. (or first degree)	M.A.	Ph.D.
Education	(a)	16.3	15.0	18.3	21.1
	(b)	17.1	15.9	17.0	20.9
Fine arts, Music	(a)	13.3	11.6	15.7	17.0*
	(b)	17.2	16.8	16.9	21.9*
History	(a)	17.3	17.6	16.5	17.3
	(b)	19.2	19.1	18.5	21.2
English	(a)	16.9	17.0	16.1	17.5
	(b)	18.6	18.2	16.7	22.8
Philosophy	(a)	15.7	14.6	16.0	17.3
	(b)	15.4	12.2	16.5	21.4
Commerce	(a)	23.4	22.4	26.0	28.3
	(b)	23.1	12.9	27.5	26.2
Economics	(a)	21.4	20.9	22.6	23.6
	(b)	24.0	23.0	23.2	31.2
Geography	(a)	15.2	13.5	20.2	22.9*
	(b)	16.3	14.1	18.7	23.8*
Law	(a)	30.6	30.7	32.4	21.8*
	(b)	32.1	32.0	35.4	28.2
Pol. Science and Pub. Admin.	(a)	23.7	29.9	19.1	21.0*
	(b)	22.8	24.2	20.5	26.0
Psychology	(a)	17.5	15.7	18.6	21.0
	(b)	19.1	13.5	22.9	24.7
Agriculture	(a)	16.2	15.9	14.0	19.0
	(b)	17.0	16.0	19.3	22.3
Forestry	(a)	18.5	18.3	18.3	20.4*
	(b)	20.4	20.5	18.0	25.9*

TABLE A-5b (cont'd)

Field of Study	Birth Year	All degrees	B.A. (or first degree)	M.A.	Ph.D.
Medicine	(a)	41.7	42.0	45.8*	40.4*
	(b)	42.4	41.8	51.3	39.2
Dentistry	(a)	33.8	32.1	40.6*	---
	(b)	28.5	28.3	37.1	---
Pharmacy	(a)	18.1	18.3	---	---
	(b)	17.8	17.5	---	28.8*
Biology	(a)	17.3	15.9	19.3	18.7
	(b)	18.7	16.3	17.6	22.6
Biochemistry	(a)	24.1	25.9	27.8	23.9
	(b)	25.9	20.7	31.8	24.6
Architecture	(a)	21.7	21.7	21.2	0
	(b)	27.6	27.4	34.7	---
Engineering	(a)	20.3	20.2	20.6	21.8
	(b)	22.5	22.3	22.6	27.3
Chemistry	(a)	17.8	16.9	17.6	18.9
	(b)	20.6	18.8	20.8	24.2
Physics	(a)	16.8	14.3	19.3	19.8
	(b)	20.6	18.1	19.5	25.2
Math	(a)	17.5	16.9	17.5	20.4
	(b)	23.0	22.2	23.8	25.9
Geology	(a)	20.2	20.0	18.6	21.8
	(b)	22.5	21.2	24.0	23.7
General Arts and Science	(a)	18.6	18.6	0	0
	(b)	18.1	18.1	0	0
All	(a)	21.0	—	—	—
	(b)	22.6	—	—	—

(a) birth year 1930-34

(b) birth year 1920-29

* Less than 50 persons - confidential in source.

TABLE A-5b (Cont'd)

N.B. 9% did not report employment income. Omitted were Religion and Theology because employment income is not comparable and all fields with less than 400 persons in total.

"Full-time for at least 40 weeks" does not mean the same thing for persons in academic life as it does for others. Hence, Ph.D. employment income is not strictly comparable with other incomes in most cases. 42-46% of each degree holders are employed in Ontario and are generally paid more than are persons working elsewhere. But living costs are usually higher in Ontario also. Insofar as switching of fields did not take place, the number in "all degrees" column show employment income by first degree. Other columns show employment income by last degree. Employment income for females is available in the source and is 60-80% of male income, cell by cell.

SOURCE: Highly Qualified Manpower 1973 Survey

TABLE A-6a

Female/Male Annual Earnings ratios by Occupation, Sex, Education,
Canada 1971

<u>Occupation</u>	<u>Full-time</u>	<u>All</u>
Managerial/Professional	.56	(.49)
Clerical	.67	(.59)
Sales	.49	(.34)
Services	.50	(.37)
Primary	.47	(.38)
Blue collar	.53	(.47)
Other	.55	(.47)
<u>Age</u>		
15 - 19	.89	
20 - 24	.77	
25 - 34	.66	
35 - 44	.56	
45 - 54	.56	
55 - 64	.60	
65 +	.59	
<u>Education</u>		
Elementary or less	.55	
1 - 3 years high school	.58	
4 - 5 years high school	.60	
BA or first degree	.64	
MA or Ph.D	.71	
All	.59	(.50)

N.B. Ratios reported are for earnings of full-year, full-time employees; in parentheses are earning ratios for all employees.

SOURCE: Gunderson (1976)

TABLE A -6b

Average Employment Income of University Graduates by Selected Field of Study, Birth Year and Sex, Canada 1971,73
 (in thousands of dollars)

Field of Study**	Birth Year		Female/male ratio
	1940-44	1920-29	
	Male		
Education	12.1	17.1	.56
Fine Arts, Music	12.2	17.2	.89
History	12.6	19.2	.31
English	13.1	18.6	.98
French	11.8	15.6	1.02
Other Languages	12.3	15.9	.75
Philosophy	10.9	15.4	.12
Religion and Theology	7.5	8.6	.06
Commerce	1.63	23.1	.05
Economics	1.59	24.0	.06
Geography	13.1	16.3	.20
Law	19.0	32.1	.05
Pub. Adm. and Pol. Science	14.0	22.8	.17
Psychology	15.1	19.1	.52
Social Work	13.0	18.0	1.03
Sociology	13.2	18.1	.59
Agriculture	12.0	17.0	.03
Forestry	13.4	20.4	.01
Vet. Medicine	18.2	20.3	.02
Medicine	26.1	42.4	.08
Dentistry	26.9	28.5	.04
Pharmacy	15.1	17.8	1.79
Biology	11.9	18.7	.32
Biochemistry	13.8	25.9	.26
Zoology	12.7	23.2	.26

TABLE A-6b (Cont'd)

Field of Study**	1940-44	1920-29	Female/male ratio
Male			
Architecture	13.5	27.6	.06
Engineering	14.7	22.5	.01
Chemistry	12.6	20.6	.09
Physics	13.4	20.6	.04
Math	13.8	23.0	.16
Geology	13.4	22.5	.02
General Arts	12.6	18.1	.43
General Science	<u>13.5</u>	<u>18.0</u>	<u>.14</u>
All Males	14.5	22.6	.25
Female			
Education	10.8	12.8	.56
Fine Arts, Music	9.5*	12.3	.89
History	11.4	12.2	.31
Library Science	11.1	13.2	2.55
English	10.8	12.8	.98
French	11.4	12.5	1.02
Commerce	10.2	13.5	.05
Psychology	11.1	12.8	.52
Social Work	11.2	13.0	1.03
Sociology	10.8	10.7*	.59
Household Science	10.9	13.0	31.36
Medicine	15.0	24.3	.08
Nursing	9.8	12.4	76.17
Math	12.7	13.3*	.16
General Arts	<u>16.6</u>	<u>11.7</u>	<u>.43</u>
All Females	11.2	13.2	25.0

TABLE A-6b (Cont'd)

- * Fewer than 200 persons.
 - ** Field of study for last degree.
- N.B. Fields with fewer than 2000 persons of all ages were ignored. Notice that the fields are not always comparable, e.g., religion usually indicates a housing allowance not reported as employment income; there are no advanced degrees for General Arts/ Science; Law and Medicine require more than four years of study, etc. about 9% of sample did not report their employment incomes.

SOURCE: Highly Qualified Manpower 1973 Survey of persons with university degrees in 1971.

TABLE A-7a

Selected Data on Visas to U.S. Issued to Canadians 1970-75 Type
of Visa (First Admission)

Year	Spouses and Children of Students		Spouses and Children of Students		Immigrant Students from Residence in Canada
	Students	Born in Canada	Students	Residence in Canada	
1970	13233	2299	15591	2630	1642
1971	9248	1618	11134	1860	1400
1972	9739	1582	11386	1785	1230
1973	7154	1165	8358	1346	1127
1974	8735	1044	10152	1219	1008
1975	8618	885	10670	1067	944

SOURCE: U.S. Immigration and Naturalization Service.

TABLE A-7b

Canadian Students Studying Abroad, 1972

U.S.	9,679
United Kingdom	1,074
France	920*
Germany	180*
Belgium	115
Switzerland	111
Australia	110
Italy	50
Austria	40
New Zealand	19
Poland	18
Japan	18
Sweden	14
Greece	12
Spain	11
All other Countries	30
Total	12,401

* Interpolations

SOURCE: Statistics of Students Abroad 1969-1973,
Office of Statistics, UNESCO

N.B. Compare the US total with the numbers
found in Table A-7a using, e.g., an
assumption that a student stays in the
US for an average of three years.

TABLE A-8

Unemployment and Participation Rates by Sex, Age and Educational Attainment, Ontario 12
Months ending April 1977

	Less than Grade 9	High School	Some Post- Secondary	Post-Secondary diploma	University degree
Males 15 - 25 years					
Ave. Participation Rate*	53.4	65.9	55.6	79.9	72.3
% in school full-time	32.9	54.2	55.8 - 69.0	39.0 - 55.8	62.2
Subtotal	86.3	120.1	111.4 - 124.6	118.9 - 135.7	134.5
Ave. Unemployment Rate*	20.0	13.2	8.3	6.6	5.6
Corrected Unemployment Rate	23.2	11.0	6.7 - 7.5	4.9 - 5.6	4.2
Females 15 -25 years					
Ave. Participation Rate*	39.6	57.1	51.2	84.6	75.7
% in school	25.7	48.3	43.1 - 61.3	31.5 - 43.1	47.4
% with children	14.0	7.7	6.2 - 7.1	7.1 - 7.7	6.7
Subtotal	79.3	113.1	100.5 - 119.6	123.2 135.4	129.8
Ave. Unemployment Rate*	22.2	12.9	9.1	7.4	8.2
Corrected Unemployment Rate	28.0	11.4	7.6 - 9.1	5.5 - 6.0	6.3

TABLE A-8 (Cont'd)

	Less than Grade 9	High School	Some Post- Secondary	Post-Secondary diploma	University degree
Males 25 years and over					
Ave. Participation Rate *	68.3	87.8	90.0	90.5	90.9
% 65 or over	23.9	8.8	5.3 - 6.4	4.6 - 5.3	5.9
% in school full-time	0.6	0.7	3.3 - 4.8	2.3 - 3.3	7.3
Subtotal	92.8	97.3	98.6 - 101.2	97.4 - 99.1	104.1
Ave. Unemployment Rate*	5.1	3.8	3.3	2.3	2.1
Corrected Unemployment Rate	5.5	3.9	3.3	2.3 - 2.4	2.0
Females 25 years and over					
Ave. Participation Rate*	28.6	48.1	54.1	54.9	64.0
% 65 or over	29.5	12.2	9.3	9.3	7.1
% in school full time	0.7	0.6	1.7 - 3.2	1.2 - 1.7	4.9
% with children under 6	9.4	12.0	13.7 - 18.3	12.0 - 13.7	39.9
Subtotal	68.2	72.9	78.8 - 84.9	77.4 - 79.6	115.9
Ave. Unemployment Rate*	7.9	6.9	5.1	5.1	4.3
Corrected Unemployment Rate*	11.6	9.5	6.0 - 6.5	6.4 - 6.6	3.7

SOURCE: * Special tabulation by Statistics Canada.

TABLE A-8 (Cont'd)

NOTES: In Canada, as in other countries, "unemployment" is defined in a strange manner for essentially political reasons, e.g., if one is working for pay or in anticipation of profit (perhaps in a family business) for as little as one hour a week, even though on terminal vacation pay or idle because of a labour dispute, then one is not unemployed. One can hold a part-time job but cannot be partly unemployed." Further, although not working and without a job, a person may be out of the labour force rather than unemployed. To find out which, the government asks if you are currently in jail or are under 15 years, an Indian on a reserve or a resident of the Yukon or Northwest Territories. If the answer to any of these is "yes", you cannot be "unemployed", and it is difficult although not impossible to be unemployed if you are a student taking about 75% or more of a "full load". The final test of whether you are out of the labour force or unemployed is whether or not you actively sought work during the past month. If not, even though the reason was that there were simply no jobs to be found, you were not unemployed.

In consequence of these definitions, the unemployment rate should be adjusted and some of the necessary data are available. Start with the participation rate, the percentage of persons in the reference population who are either employed or unemployed, and then add to this the percentages at school, 65 years or older and, for females, (because females are more likely to care for young children in our society) those with children under 6 years of age. These percentages had to be estimated from inadequate data in the 1971 Census. Because the educational categories used in the labour force survey are not the same as used in the Census and because there will have been changes between 1971 and 1977, small differences in the "corrected unemployment rates" between one category and another should not be taken seriously. Because the birth rate has fallen since 1971, the percentage of females with children under 6 years has been slightly reduced.

TABLE A-9a

Percentage Distribution of Employment by Sector, Sex and Occupation, Ontario 1971

Sector	Managerial and Adminis- trative	Pro- fessional	Clerical	Sales	Ser- vice	Other	NEC/ NR*	Total	% Male
Agriculture	M 0.2 F 0.3	1.0 0.9	0.3 3.5	0.4 0.9	0.2 0.9	97.1 91.8	0.8 1.7	100.0 100.0	73.4
Other Primary	M 2.7 F 3.2	8.0 6.5	3.2 58.0	0.6 ---	1.7 6.5	80.0 19.3	3.8 6.5	100.0 100.0	93.9
Manufacturing	M 5.1 F 1.6	7.0 2.6	9.2 32.3	6.4 2.5	2.3 1.6	64.2 54.5	5.8 4.9	100.0 100.0	75.5
Construction	M 3.7 F 5.9	2.5 0.8	2.0 73.1	1.2 2.5	1.0 4.2	85.9 11.8	3.7 1.7	100.0 100.0	94.2
Transportation	M 3.7 F 3.6	7.2 3.2	16.7 77.2	1.9 0.9	3.1 4.9	63.8 9.0	3.6 1.2	100.0 100.0	81.4
Trade	M 4.4 F 1.4	2.3 1.5	9.9 41.6	42.7 42.9	2.4 4.1	32.8 6.7	5.5 1.8	100.0 100.0	60.7
Finance	M 21.0 F 4.4	4.5 1.2	17.1 81.1	41.9 7.3	6.7 4.3	6.4 0.5	2.4 1.2	100.0 100.0	47.3
Service	M 8.7 F 2.0	38.1 39.8	5.1 22.7	2.8 1.3	29.8 31.2	11.5 1.5	4.0 1.5	100.0 100.0	42.2
Pub. Admin.	M 15.0 F 5.4	15.7 12.7	12.8 71.1	0.5 0.6	31.6 7.0	18.7 1.4	5.7 1.8	100.0 100.0	70.9
NEC/NR	M 0.6 F 0.2	0.7 0.3	1.0 3.0	1.2 0.7	0.8 0.8	90.6 94.1	100.0 100.0	55.3	

* Not elsewhere classified or not reported.
 SOURCE: Census

TABLE A-9b
Occupational Distribution of Labour Force Ontario (1971) and
USA (1970)
 (percentages)

Occupation	45 Years or more		25-44 Years	
	Ontario	USA	Ontario	USA
Professional	M	8.3	11.7	13.7
	F	13.4	14.4	18.9
Managerial	M	7.2	13.8	6.8
	F	2.8	5.4	2.4
Sales	M	10.3	7.1	9.9
	F	11.6	8.7	6.7
Clerical	M	8.1	7.1	7.0
	F	29.1	28.8	34.6
Other	M	66.1	60.2	62.7
	F	43.1	42.6	37.2
Total	M	100.0	100.0	100.0
	F	100.0	100.0	100.0

SOURCE: Censuses

TABLE A-10a

Sectorial Distribution of the Employed Labour Force in US, 1970

	All Ages	Age Group 25-44
Agriculture and other primary	4.6	3.9
Manufacturing	25.9	28.1
Construction	6.0	6.7
Transportation	6.8	7.5
Trade	20.0	17.6
Finance	5.0	5.0
Services	26.2	25.5
Public Administration	5.5	5.7
Total	100.0	100.0

SOURCE: 1970 Census

TABLE A-10b

Percentage Distribution of Employment by Sector, Sex and Occupation, US 1970 (all ages)

Sector	Managerial & Administrative	Professional	Clerical	Sales	Ser-vice	Other	Total	% Male
Agriculture, Foods	M 0.9	3.0	0.4	0.3	0.4	95.0	100.0	88.5
	F 0.9	2.3	13.3	1.1	2.1	80.3	100.0	
Mining	M 6.5	11.1	4.0	0.8	1.6	76.0	100.0	91.9
	F 2.9	8.3	70.8	0.5	2.0	15.6	100.0	
Manufacturing	M 6.8	12.5	6.4	3.4	2.7	68.2	100.0	71.4
	F 1.2	3.9	27.5	1.0	1.2	65.2	100.0	
Construction	M 9.7	4.5	2.3	0.7	0.9	81.9	100.0	94.2
	F 4.5	4.4	70.2	1.4	2.4	17.1	100.0	
Transportation	M 8.4	8.6	10.7	1.3	2.7	68.3	100.0	78.5
	F 3.3	4.2	74.2	1.3	5.2	11.8	100.0	
Trade	M 20.9	3.4	7.0	21.1	9.6	38.0	100.0	58.6
	F 6.7	1.5	32.5	28.7	22.5	8.1	100.0	
Finance	M 25.3	7.2	18.2	36.3	6.9	6.1	100.0	50.1
	F 6.6	2.9	78.4	8.3	3.1	0.7	100.0	
Service	M 9.8	42.1	5.3	1.4	19.5	21.9	100.0	40.2
	F 2.5	33.1	24.7	0.6	35.1	4.0	100.0	
Public Ad- ministration	M 12.5	18.9	25.3	0.2	25.5	17.6	100.0	69.2
	F 6.4	11.2	72.6	0.3	7.2	2.3	100.0	

SOURCE: Census

TABLE A-10c

Percentage Distribution of Employment by Sector, Sex and Occupation, US 1970 (ages 25-44)

Sector	Managerial & Administrative	Professional	Clerical	Sales	Service	Other	Total	% Male
Agriculture, Food	M 1.2 F 1.0	4.9 2.8	0.5 14.1	0.4 1.0	0.4 1.7	92.6 79.4	100.0 100.0	86.7
Mining	M 5.7 F 2.6	14.1 8.4	3.8 73.9	0.9 0.4	1.0 1.5	74.5 13.2	100.0 100.0	92.0
Manufacturing	M 7.1 F 1.1	15.9 4.2	6.0 26.0	3.5 0.9	1.6 0.9	65.9 66.9	100.0 100.0	73.4
Construction	M 9.6 F 3.9	5.3 4.3	2.2 72.2	0.7 1.2	0.6 2.2	81.6 16.2	100.0 100.0	94.6
Transportation	M 7.8 F 3.6	10.0 4.7	10.3 70.3	1.5 1.3	1.8 4.4	68.6 15.7	100.0 100.0	80.6
Trade	M 24.8 F 6.7	4.7 1.8	5.8 35.0	21.3 24.2	6.2 23.6	37.2 8.7	100.0 100.0	60.8
Finance	M 28.1 F 6.7	9.2 3.2	16.8 78.3	37.5 8.6	3.8 2.4	4.6 0.8	100.0 100.0	55.7
Services	M 10.3 F 2.3	53.0 39.8	3.6 23.5	1.5 0.5	12.4 30.2	19.2 3.7	100.0 100.0	43.4
Public Administration	M 9.8 F 5.6	21.5 12.2	22.9 71.6	0.2 0.4	31.0 7.8	14.6 2.4	100.0 100.0	72.4

TABLE A-11

Demand for New Entrants to Ontario Labour Force, 1974-82

(In thousands; percentages in parentheses)

Occupation		Secondary School or less	Post Secondary	Both
Manag. and Admin.	M	44 (50)	44 (50)	88 (10)
	F	14 (70)	7 (30)	22 (3)
Professional	M	30 (20)	118 (80)	149 (17)
	F	42 (30)	97 (70)	139 (19)
Clerical and Sales	M	105 (75)	35 (25)	140 (146)
	F	269 (90)	30 (10)	299 (41)
All other	M	492 (97)	15 (3)	499 (57)
	F	262 (97)	8 (3)	270 (37)
Total	M	663 (76)	212 (24)	875 (100)
	F	588 (81)	142 (19)	730 (100)
		1251	352	1605

TABLE A-12

New Entrants to the Ontario Labour Force, 1974-1972
 (in thousands, percentages in parenthesis)

Source	Secondary School or less	Post Secondary	Both
Net immigration (a)			
M	120.8	(78)	34.0
F	<u>68.2</u>	(84)	<u>13.2</u>
Both	<u>189.0</u>		<u>47.2</u>
Net immigration (b)			
M	105.3	(68)	49.5
F	<u>60.3</u>	(74)	<u>21.4</u>
Both	<u>165.3</u>		<u>70.9</u>
From Educ. System			
M	552.1	168.0	720.1
F	<u>447.7</u>	<u>201.2</u>	<u>648.9</u>
Both	<u>999.8</u>	<u>369.2</u>	<u>1369.0</u>
Total (a)			
M	672.9	202.0	874.9
F	<u>515.9</u>	<u>214.4</u>	<u>730.3</u>
Both	<u>1188.8</u>	<u>416.4</u>	<u>1605.2</u>
Total (b)			
M	657.4	217.5	874.9
F	<u>507.1</u>	<u>222.6</u>	<u>730.3</u>
	<u>1165.1</u>	<u>440.1</u>	<u>1605.2</u>

* The division of net immigration between males and females by education is based on the division of gross immigrants to Canada in recent years.

TABLE A-13a

College/High School Income Ratios for Male Full-time Workers
(25-34 Years), U.S.

Year	5 or more years of College/ High School Grad.	4 Years of College/ High School Grad.
1969	1.51	1.39
1974	1.38	1.16
Percentage change	-8.6	16.5

N.B. As Table A-4a indicates, a much large fraction of the U.S. labour force has university degrees than does Ontario.

SOURCE: Freeman (1976b)

TABLE A-13b

1969-1975 Changes in Occupational Distribution by Education
and Sex, U.S.

(in percentage points)

Occupation	Males		Females	
	College	High School	College	High School
Professional	-6.5	-1.6	-11.3	0.0
Managerial	1.3	-1.5	3.4	0.6
Sales	1.6	-0.4	2.0	0.3
Clerical	0.5	-0.1	4.5	-1.4
Other	3.1	3.6	1.4	0.5
All	0.0	0.0	0.0	0.0

SOURCE: Freeman (1976b)

TABLE A-14a

Distribution of 228,115 Ontario Residents who hold university degrees and are employed by field of study for last degree and sector, both sexes

Sector	Educ.	Fine Arts	Human.	Field of Study				Math. Phys.Sci.	Gen'l Arts & Sci.	Total
				Soc.Sci.	Agric. Biol.Sci.	Engin. Arch.	Health Medicine			
Education	911	68	947	619	225	140	79	298	232	3518
Mfg. & Constr.	24	10	101	329	68	557	11	159	58	1316
Transp., Trade, Financ.	40	13	126	448	40	226	118	86	101	1198
Health/Welfare	24	5	49	160	77	3	713	12	22	1065
Serv. to Mgmt.	10	4	52	469	21	254	2	77	71	960
Gov't (Fed.)	31	8	108	293	85	147	19	127	41	860
Relig. & other serv.	33	20	235	87	17	12	8	11	36	459
Gov't (other)	27	2	50	129	58	59	17	16	10	369
Agr. & Min.	4	0	11	23	67	45	0	25	14	188
Unspecified	9	-	10	13	6	7	2	5	14	67
TOTAL	1113	130	1689	2570	664	1450	969	816	599	10,000
% in market sheltered sectors*	91	67	80	50	68	35	86	58	55	63

* These sectors are taken to be: Transportation & Communication, Education, Health and Welfare, Religion, Government Administration (all levels).

Source: Highly Qualified Manpower 1973 Survey.

TABLE A-14b

Sectoral Location of Persons with University Degrees who Reported Employment Income by last Degree, Ontario, 1971,73
 (percentages)

Sector	B.A.	M.A.	M.D.	Ph.D.
Primary	1.9	1.1	4.8	1.3
Manufacturing	15.8	9.3	0.9	5.1
Construc./Transp./Commun.	5.2	2.7	0.2	1.1
Trade and Finance	10.9	5.5	0.6	0.8
Health and Welfare	4.2	9.2	83.5	3.6
Education	34.7	44.4	4.7	60.3
Community/Relig. Services	4.0	4.5	0.4	2.8
Business Services	10.8	6.7	0.1	4.5
Federal Government	8.6	11.4	3.4	18.1
Other Government	3.8	5.1	1.1	2.3
Not Specified	0.1	0.1	0.3	0.1
Total	100.0	100.0	100.0	100.0
Number	(125,490)	(31,325)	(10,595)	(10,550)

N.B. Included with M.D. are 2310 dentists and 785 veterinarians; included with M.A. are "graduate level diplomas/certificates"; included with B.A. (ordinary and honours) are 27,100 lawyers and persons with "post-bachelor certificates/diplomas".

SOURCE: Highly Qualified Manpower 1973 Survey.

TABLE B-1

Nurses Registered in Ontario in 1973

	Percentages
All (78,054)	100
Not living or employed in Ontario	9
Living or employed in Ontario:	91
Employed in Health Field	
- Full time	44
- Part time	14
Employed outside Health Field	4
Not in Labour Force	29

N.B. Nursing Assistants and Nursing Aides omitted. 66% of employed registered nurses were trained in Ontario

SOURCE: College of Nurses of Ontario (1973)

Residents of Ontario who had university degrees in 1971

		Born in Canada		Born Outside Canada		
Secondary School Location		Male	Female	Male	Female	All
Ontario	102,320	48,895	35,070	13,275	4,860	169,350 (65%)
	26,600	12,530		16,325		91,530 (35%)
	128,920	61,430	(24%)	49,345 (19%)	21,185 (8%)	260,880 (100%)
University Location						
	97,274	48,035		15,515	5,290	166,120 (64%)
	26,325	12,350		5,125	1,400	45,200 (17%)
First degree:	5,320	1,045		28,705	14,495	49,565 (19%)
	128,920	61,430	(24%)	49,345 (19%)	21,185 (8%)	260,885 (19%)
	(49%)					(100%)
Ontario	9,645			3,545		60,730 (68%)
	2,135			460		7,585 (9%)
	9,280			3,275		20,785 (23%)
Other Canadian	21,060			7,280		89,100 (100%)
	(24%)			(8%)		(100%)
						All
Outside Canada	13,460					240,380 (63%)
	1,465					60,375 (16%)
	1,605					79,745 (21%)
Total	16,530					380,500 (100%)
	(49%)					(100%)
Last degree (if more than one:		Male		Female		
Ontario	167,370			73,010		240,380 (63%)
	43,115			17,265		60,375 (16%)
	57,890			21,860		79,745 (21%)
Other Canadian	268,375			112,135		380,500 (100%)
	(71%)			(29%)		(100%)
All degrees:						
Ontario						
Other Canadian						
Outside Canada						
Total						

SOURCE: Highly Qualified Manpower 1973 Survey.

N.N.B. "All degrees" double or triple counts persons with more than one degree.

TABLE B-2b

Residents of Ontario holding at least one degree by University

Toronto	68,080
Western	25,545
Queen's	15,745
McMaster	13,465
McGill	9,145
York*	8,820
Ottawa	8,215
Waterloo	6,485
Carleton	6,235
Windsor	6,015
Manitoba	5,675
U.B.C.	4,825
Wilfred Laurier	4,420
Saskatchewan	3,655
Guelph	3,480
Alberta	2,895
Sir George Williams	2,590
Laurentian	2,490
Dalhousie	2,075
Other Universities in Ontario	4,595
Other Universities in Canada	<u>11,055</u>
Sub-total all Ontario	167,775
Sub-total all Other Provinces	50,130
Universities in U.S.A.	20,200
Universities in Great Britain	10,015
Universities in India	2,655
Universities in Phillipines	2,145
Universities in Other Countires	<u>14,575</u>
Sub-total all foreign	<u>49,590</u>
Total	<u>267,495**</u>

SOURCE: Highly Qualified Manpower 1973 Survey

N.B. Notice that there is double counting.

* Includes 3,005 Osgoode.

** Of which 41.6% had a degree from outside Ontario.

TABLE B-3a

Ph.Ds Awarded Canada/US 1964-74

Year	To Canadians by U.S. Universities ¹	By Canadian Universi ² ties	By Ontario Universi ³ ties
	All	returned to Canada	
1964	239	127	481
1965	270	146	566
1966	311	189	696
1967	356	176	779
1968	415	209	1006
1969	466	224	1108
1970	529	271	1375
1971	528	292	1625
1972	576	325	1724
1973	559	308	1929
1974	489	270	1895

SOURCE: National Academy of Science (US) and Statistics Canada (Cat. No. 81-211 and 81-229 Annual).

1. Undercounted in that "not reported" and "unknown" have been ignored. For example, Canadians whose location is unknown come to 9-10% of total.
2. Includes foreign as well as Canadian students. Recently about one-third of all graduate students are non-Canadian but, with respect to Ph.D students, this percentage may be too large.
3. Includes both foreign students and students who are students of other provinces. Recently about 60% of all students originated outside Ontario but, with respect to Ph.D students, this percentage is probably too large and residence may change while a student is in university.

TABLE B-3b

University Location and Field of Study of Canadians who earned
Doctorates, 1968-73

	Number of Doctorates	% from U.S. Universities	% from Ontario Universities
Math/Computer	521	22	46
Physics/Astron.	764	16	42
Chemistry	1171	8	37
Earth Science	397	23	31
Engin.	1327	16	46
Agri. Science	422	32	13
Med. Science	692	8	36
Biochem.	218	20	21
Biol. Science	927	27	30
Anthro/Sociol.	177	47	21
Economics ²	259	54	29
Psychology	733	27	40
Geography	143	36	24
Pol. Sci/ Pub.Ad.	100	44	24
Other Social Sci (Soc. Work)	161	22	40
Art/Music	57	65	26
History	254	33	37
Lang/Lit	611	25	42
Other Human. (incl. Philos.)	229	31	41
Bus. Admin.	123	82	16
Relig.	129	19	59
Education	968	48	18
Other Profession	94	57	24
All fields	10419	26	35

TABLE B-3b (Cont'd)

SOURCE: Statistics Canada and (US) National Academy of Science

¹Excluding first professional degrees

²May include some political scientists

N.B. Data on students who went to other countries than the US were not available and not all students counted were Canadian residents, e.g., some doctoral recipients were in Canada on student visas and some Canadians immigrated permanently to the U.S. Approximately 60% of those who received Doctorates from US universities returned to Canada and at least 90% of Doctorates awarded to Canadians by foreign universities were from US universities.

TABLE B-3c

Undergraduate Origin and Graduate School Location of Canadians
who earned Ph.Ds in U.S., 1960-66

Canadian Undergraduate University:	
Toronto	322
U.B.C.	288
Alberta	222
McGill	200
Manitoba	140
Saskatchewan	112
Queen's	100
All others	<u>571</u>
Total	1955
Location of U.S. Graduate School:	
New York	270
Massachusetts	216
California	214
Illinois	201
Michigan	126
Wisconsin	115
Indiana	99
New Jersey	82
Minnesota	72
Pennsylvania	62
Washington	58
Oregon	58
Connecticut	55
Ohio	55
All Other states	<u>272</u>
Total	1955

SOURCE: (U.S.) National Academy of Sciences

N.B. Canadians who did not attend Canadian Universities as Undergraduates are omitted and not all who did attend Canadian Universities were Canadians.

TABLE B-4a

Residents of Ontario with PhDs or MDs by Field

<u>Humanities, Languages</u>	
Fine Arts and Music	95
Classics, Archeology	130
English, Humanities	470
Philosophy, Theology	770
History	385
Modern Languages, Linguistics	435
	2,285
<u>Social Sciences, Education</u>	
Administration	155
Economics, Ag. Econ.	485
Geog. Planning	235
Law*	9,155
Political Science	230
Sociology, Anthropology	295
Psychology	605
Education	315
Ed. Psych. Social Work, Clin. Psych.	365
	11,840
<u>Physical Sciences</u>	
Chemistry, Chem. Eng.	1,170
Geology, Metallurgy, Petrol., Engin. etc.	725
Meteorol., Oceanog.	90
Math., Math. Stat.	515
Computer	55
Physics, Astronomy	975
Engin. (not elsewhere classified)	810
	4,940
<u>Biological Sciences</u>	
Biology	350
Biochemistry	435
Agric. Forest. Ag. Engin.	360
Botany	260
Zoology	400
Dietetics	25
Veterinary Med.	65
	1,895
<u>Medicine</u>	
Medicine (first degree)**	13,840
Medical Sciences	645
	14,485
Grand Total	35,445

* Of which there are 9,070 persons with law degrees.

* Of which there are 3,345 persons with degrees in dentistry.

SOURCE: Highly Qualified Manpower 1973 Survey

TABLE B-4b

Distribution of Masters and Doctorates by Field, Ontario,
Canada, U.S. 1972-73
 (percentages)

Field	Masters & Grad. Dipl.			Doctorates		
	Ont.	Canada	U.S.	Ont.	Canada	U.S.
Education	16.6	20.3	40.3	5.3	6.3	21.2
Fine & Applied Arts	.9	.9	2.3	.5	.3	2.1
History	3.0	2.7	1.9	2.2	1.8	3.3
English	4.3	3.5	2.9	4.3	3.3	4.2
Other Languages	3.4	2.8	1.6	1.9	3.3	2.8
Philosophy	2.0	1.4	.2	2.5	2.2	1.2
Religious Studies	6.0	4.4	.8	2.9	1.8	2.3
Library Science	5.7	4.6	4.0	-	-	-
Other Humanities	.5	.7	1.5	.7	.4	2.9
Area Studies	.8	.7	.4	1.0	.8	.5
Commerce	12.5	11.7	12.0	1.0	.5	2.7
Economics	4.0	3.5	1.0	2.9	2.0	3.0
Geography	1.5	1.4	.3	1.1	1.2	.7
Law	.2	.8	.4	.1	.3	.1
Man/Environment	1.6	1.2	.8	.4	.2	.2
Political Science	3.3	2.5	2.2	.9	1.0	2.6
Psychology	3.1	3.7	2.2	7.0	6.3	6.0
Social Work	3.9	3.8	3.5	.7	.3	.6
Sociology & Anthropology	3.0	2.8	1.1	1.5	1.7	2.7
Other Social Science	.9	1.0	.9		.6	.7

TABLE B-4b (Cont'd)

Field	Masters & Grad. Dipl.			Doctorates		
	Ont.	Canada	U.S.	Ont.	Canada	U.S.
Agriculture	.7	1.3	.7	1.9	3.3	1.9
Biochemistry	-	.1	.1	1.2	1.5	.9
Biology	1.0	1.5	1.8	2.4	3.9	7.0
Botany	.1	.2	.1	.9	1.4	.7
Household Science	.2	.3	.6	.2	.1	.5
Veterinary Medicine	.2	.2	-	.2	.4	.1
Zoology	.5	.6	.2	3.0	2.4	1.0
Engineering	8.7	8.2	6.3	18.0	15.0	10.3
Architecture	.2	.5	.4	-	-	-
Forestry	.1	.3	.1	-	.5	.4
Dental Studies	.2	.3	.2	-	.1	-
Medical Studies	1.9	2.4	.8	6.5	8.4	.4
Nursing	.3	.7	.8	-	-	-
Pharmacy	.8	.2	.1	-	.5	1.2
Other Health	.3	.8	.8	.2	.2	.5
Chemistry	1.2	1.5	8.4	9.8	11.7	5.4
Geology & earth Science	.7	1.0	.6	1.8	2.0	1.5
Mathematics	3.7	3.7	3.8	7.7	5.9	3.6
Physics	1.6	1.6	.7	8.8	7.8	4.1
Other Physical Science	-	.4	.3	.5	1.6	.5
Other	-	-	.2	-	-	.2
All	100.0	100.0	100.0	100.0	100.0	100.0

Numbers may not add to totals because of rounding

N.B.: In less detail, UNESCO reports parallel information for Canada and many other countries for baccalaureate and first professional degrees. In the case of Canada, however, these UNESCO data are incorrect. The University of Toronto and perhaps other Canadian universities as well do not report major field for many undergraduate degrees.

TABLE B-5

Distribution of Resources by program of Study, 1972-73
 (percentages)

Field	Graduate/ Medicine/ Law	All (Other) Undergraduate Programs
Health and Medicine	20.5	5.9
Social Sciences, Social Work and Commerce	18.1	27.6
Law	14.2	--
Humanities	13.3))	29.2
Fine and Applied Arts	0.6)	
Physical Sciences and Math	11.1	13.4
Engineering and Architecture	9.1	6.6
Education	8.8	15.5
Agriculture and Biological Sciences	4.3	1.8
All	100.0	100.0

N.B. Based on degrees awarded using following relative "values". Student grants and loan subsidies ignored.

First Column: 1 Ph.D = 2 LL.B. = 4 M.A.
 Second Column: BIU weights used.

SOURCE: Ministry of Colleges and Universities

TABLE B-6

Net Extra Taxes paid and Net Extra Earnings Per Student For
Students from Different Groups of Public Senior Schools,
City of Toronto, 1970-73

School Group/ Neighbourhood	Taxes (a)	Earnings (b)	a/b
Rich (4 Schools)	\$13,130	\$20,990	63%
Middle income (4 Schools)	12,070	17,370	69
Lower-Middle Income (11 Schools)	9,320	9,560	97
Poor (10 Schools)	8,390	6,700	125

N.B. Net extra taxes are gross taxes collected minus educational public costs and subsidies paid during the six years past school leaving age; net extra earnings are earnings above those received by persons who stopped their schooling after Grade 11 and are net of taxes. Present values are reported using a discount rate of 4 per cent and a starting date of age 16. Grade-by-grade retention rates were applied to the students in each group of schools and the earnings data used are Canada-wide, cross-section averages by educational attainment. Clearly only part of the differences reported above in earnings or in the differences between taxes and earnings should be attributed to education.

SOURCE: Buttrick (1977)

TABLE B-7

Percentage of Provincial Operating Grants spent on Instructional
Salaries, Ontario

Year	Elementary*	Secondary	CAATS	Universities
1975	-	-	61.9	53.1
1974	55.9	58.8	64.2	53.1
1973	59.5	63.0	60.1	53.9
1972	58.8	62.8	61.8	51.7
1971	58.7	62.3	-	49.2
1970	57.8	61.5	-	48.3
1969	57.5	61.3	-	-
1968	55.0	58.6	-	-
1967	53.4	56.2	-	-
1966	53.5	57.4	-	-
1965	54.0	56.0	-	-
1964	54.9	55.4	-	-
1963	56.1	57.7	-	-

* Including Separate Schools

N.B. For Elementary and Secondary schools, instructional day school salaries and fringe benefits are taken as a percentage of net day school expenditures as reported in the Minister's Annual Reports. For CAATS, instructional and non-instructional salaries including fringe benefits are taken as a percentage of provincial operating grants and reimbursements as reported by the Ministry of Colleges and Universities.

For Universities, academic salaries plus estimated fringe benefits are taken as a percentage of Provincial grants (both on operating budgets) as reported in the Committee of Financial Offices Report (Actuals).

SOURCE: Ministry of Education and Ministry of Colleges and Universities.

TABLE B-8

Data for Table 7
 (in millions of dollars)

Level	No Voucher	Equal Voucher	Unequal Voucher
Grade 13	1000	1338	1102
Grades 11 - 12	3895	4280	3916
Grades 9 - 10	5018		
Grades 1 - 8:			
current ratio	11263		
lower ratio	13517		
Possible Addition to Grades 1 - 8			
if Grade 13 dropped:			
current ratio	121	161	132
lower ratio	144	192	159
Kindergarten:			
current ratio	2332		
lower ratio	2903		

N.B. Vouchers only in Grades 11-13. Because the same average salaries were used across several Grades, these estimates are not reliable unless aggregated.

TABLE C-1

Apparent "Demand" for Education, Ontario, 1974

Status	Age Group	
	18 - 24	25 - 69
(1) Full-time Student	23%	1%
(2) Part-time Student	21	6
(3) Plan to become Student	14	6
(4) Plan non-credit learning	16	29
(5) All others	<u>26</u>	<u>58</u>
Total	100%	100%

<u>Education objective of (2) and (3) above</u>	
High School Diploma	17%
CAAT Diploma	16
Baccalaureate Degree	39
MA or Ph.D.	<u>28</u>
Total	100%

SOURCE: Waniewicz (1976), modified

TABLE C-2

Students Attending Universities 1975-76
(percentages)

		Residence of Students Attending Ontario		Universities, 1976	
		Full-time		Part-time*	
		Undergrad.	Grad.	Undergrad.	Grad.
Ontario: citizens		82	54	87	75
landed immigrants		<u>7</u>	<u>17</u>	<u>9</u>	<u>13</u>
Sub-total		89	71	96	88
Other Provinces		7	13	3	10
Other Countries (Student visas)		<u>4</u>	<u>16</u>	<u>1</u>	<u>2</u>
		100	100	100	100
(Number)		(142891)	(17151)	(59921)	(21321)

University Location of Full-time Students from Ontario 1975**

	Undergrad.	Grad.
Ontario	93	55
Other Provinces	2	6
Other Country (primarily US)	<u>5</u>	<u>39</u>
	100	100
Ratio of number of university students studying in Ontario to number of Ontario university students studying in all locations	1.16	1.09

SOURCE: Statistics Canada

* 2 1/2 part-time students take approximately as many courses as 1 full-time student.

** Estimation of Ontario students studying outside Canada is based on US Immigration and IIE data and an assumption that 40% of Canadians studying outside Canada are from Ontario.

TABLE C-3

Distribution of Formula Grants by University, 1973-74
 (percentages)

University	Graduate/Law/ Medicine	All Ontario Programs	Ontario Scholars*
Toronto	36.4	19.9	36.0
Western	11.6	9.2	13.6
Ottawa	10.5	6.3	3.0
McMaster	8.0	6.5	5.9
Queen's	8.0	7.2	7.6
York	6.8	8.8	4.1
Waterloo	6.5	8.9	14.3
Sub-total	87.8	66.8	84.5
Guelph	5.4	6.1	4.9
Carleton	2.9	6.5	4.1
Windsor	2.8	4.6	2.2
Wilfred Laurier	0.5	2.5	0.7
Lakehead	0.3	2.4	0.5
Laurentian	0.2	2.2	1.4
Brock	0.1	2.1	0.6
Trent	--	1.4	1.1
Ryerson	--	5.4	--
Total	100.0	100.0	100.0

* First applications to first year (1972) using 6,327 of 6,871 awarded.

N.B. Medicine and Law estimated on the basis of Fall enrolments.
 Formula grants in the first column are one-third of all formula grants.

SOURCE: Ministry of Colleges and Universities and OUAC.

TABLE C-4

Some Comparative Educational Statistics

	Ontario	Canada	U.S.	Mich. Minn. Wisc.
Ratio of high school diplomas (Grade 12) to half of 17 and 18 year olds (1973-4)	.58	.55	.76	.83
Ratio of baccalaureate degrees and 1st pro- fessional degrees to high school diplomas (Grade 12) 4 years earlier (1969-73)	.38	.41	.35	.31
Product of above two ratios	.22	.23	.27	.26
Ratio of baccalaureate and 1st professional degrees to full-time degree-credit and undergraduate enrol- ment (1970-72)				
(a) incl. Grade 13 and junior diploma holders	.18	.19	.22	.22
(b) excluding these	.25	.26	.23	.23
Ratio of MA degrees to baccalaureate and 1st professional degrees (1972)	.18	.15	.27	.25
Ratio of doctorates (excluding 1st pro- fessional) to MA degrees (1972)	.17	.18	.14	.15
Ratio of part-time to full-time university enrolments (1971-72)	.43	.48	.46	n.a.
Ratio of female to male university enrolments (1971-72)	.63	.63	.72	.74

TABLE C-4 (Cont/d)

	Ontario	Canada	U.S.	Mich. Minn. Wisc.
Expenditure per student (1972)				
(a) elementary and secondary	\$1040	\$ 980	\$1030	\$1210
(b) post-secondary	4070	3940	3820	3920

SOURCES: Statistics Canada and (U.S.) National Centre for Educational Statistics.

N.B. Post-secondary institutions that offer diplomas or certificates that are not transferable into degree credits or do not lead to university are sufficiently different and the data are so incomplete that comparisons were not made.

TABLE C-5

Some University - CAAT Full-time Student Comparisons,
1976

<u>Age</u>	Universities	CAATS
Less than 20 years	22%	48%
20 - 24 years	49	42
25 or more	<u>29</u>	<u>10</u>
All	100%	100%
<u>Status before registration</u>		
Student	80%	68%
In Labour Force	} 20	26
Other	}	6
All	100%	100%
<u>Educational Background</u>		
Less than Grade 12 Diploma	--	7%
Grade 12 Diploma	6%	66
Grade 13 Diploma (incl. some University)	89	24
University Degree	--	1
CAAT	3	--
Other (incl. not reported)	<u>2</u>	<u>2</u>
	100%	100%

SOURCE: OCIS, OUAC and Stat. Can. data banks.

N.B. Age distribution of University Students is full and part time in first two years, 1974. Therefore it is not quite comparable with CAAT data.

TABLE C-6
Data for Table 10
 (in millions of dollars)

Provincial Grants to Universities

1. High enrolment projection, constant student/ faculty ratio	8443.7
2. Medium enrolment projection, constant student/ faculty ratio	7921.3
3. Medium enrolment projection, decreasing student/ faculty ratio	8187.3

Provincial Grants to CAATS

4. High enrolment projection, constant student/ faculty ratio	4120.3
5. Medium enrolment projection, constant student/ faculty ratio	3775.7
6. Medium enrolment projection, constant student/ faculty ratio	3992.1

Provincial Grants to Students

7. High enrolment projections:	
(a) University Students	490.8
(b) CAAT Students	119.2
8. Medium enrolment projection:	
(a) University Students	460.6
(b) CAAT Students	109.2

Revenue from \$100 Tuition Fee*

9. High enrolment projection:	
(a) University Students	196.9
(b) CAAT Students	75.2
10. Medium enrolment projection:	
(a) University Students	185.1
(b) CAAT Students	69.0

* Assuming that enrolments are unaffected.

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